

MEDICAL INQUIRIES

AND

OBSERVATIONS.

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OF PENNSYLVANIA.

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REVISED AND ENLARGED BY THE AUTHOR.

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Published by Hopkins and Earle, Mathew Carey, Johnson and Warner,
Kimber and Conrad, Bradford and Inskeep, Thomas and William
Bradford, Benjamin and Thomas Kite, and Bennett and Walton.

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District of Pennsylvania, to wit :

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“ Medical Inquiries and Observations. By Benjamin Rush, M. D. Professor of the Institutes and Practice of Medicine and of Clinical Practice, in the University of Pennsylvania. In four volumes. The third edition, revised and enlarged by the author.”

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Clerk of the District of Pennsylvania.

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PREFACE.

THE author of the following edition of Medical Inquiries and Observations has changed the order in which several of the subjects were arranged in the former editions. He has given the Lectures upon Animal Life the first place in the first volume, and has arranged the Histories of Epidemics in succession to each other. Some facts have been added to several of the Inquiries, particularly to the Lectures upon Animal Life, to the History of the Phænomena of Fever, to the Observations upon the Gout, and to the Defence of Blood-letting ; but no alteration has been made in any of the medical principles of the author. He has preferred the term of “phænomena” to that of “theory” of fever, because he conceives the doctrine he has aimed to establish upon that subject, rests upon facts only, obvious not only to reason, but in most instances, to the senses.

PREFACE.

He has omitted the Lecture upon Inoculation for the Small-pox, from a belief that the universal practice of Vaccination has rendered it in a great measure an unnecessary part of the education and knowledge of a physician.

The Observations upon the Cure of Obstinate Intermitting Fevers by means of Blood-letting, contained in the former editions, have been incorporated with the defence of that remedy.

The author has added to this edition an Account of the Cure of Several Diseases by the Extraction of Decayed Teeth, published originally in the New York Medical Repository.

BENJAMIN RUSH.

October 31, 1809.

AN INQUIRY
INTO THE
CAUSE OF ANIMAL LIFE.

IN THREE LECTURES,
DELIVERED IN THE UNIVERSITY OF PENNSYLVANIA.

VOL. I.

A

AN INQUIRY, &c.

LECTURE I.

GENTLEMEN,

MY business in this chair is to teach the institutes of medicine. They have been divided into physiology, pathology, and therapeutics. The objects of the first are, the laws of the human body in its healthy state. The second includes the history of the causes and seats of diseases. The subjects of the third are the remedies for those diseases. In entering upon the first part of our course, I am met by a remark delivered by Dr. Hunter in his introductory lectures to his course of anatomy. "In our branch (says the doctor) those teachers who study to captivate young minds with ingenious speculations, will not leave a reputation behind them that will outlive them half a century.

When they cease from their labours, their labours will be buried along with them. There never was a man more followed and admired in physiology, than Dr. Boerhaave. I remember the veneration in which he was held. And now, in the space of forty years, his physiology is—it shocks me to think in what a light it appears.”* Painful as this premonition may be to the teachers of physiology, it should not deter them from speculating upon physiological subjects. Simple anatomy is a mass of dead matter. It is physiology which infuses life into it. A knowledge of the structure of the human body occupies only the memory. Physiology introduces it to the higher and more noble faculties of the mind. The component parts of the body may be compared to the materials of a house, lying without order in a yard. It is physiology, like a skilful architect, which connects them together, so as to form from them an elegant and useful building. The writers against physiology resemble, in one particular, the writers against luxury. They forget that the functions they know and describe belong to the science of physiology; just as the declaimers against luxury forget that all the conveniences which they enjoy beyond what are possessed in the most simple stage of society, belong to the luxuries of life.

* Lect. xi. p. 198.

The anatomist who describes the circulation of the blood, acts the part of a physiologist, as much as he does, who attempts to explain the functions of the brain. In this respect Dr. Hunter did honour to our science ; for few men ever explained that subject, and many others equally physiological, with more perspicuity and eloquence, than that illustrious anatomist. Upon all new and difficult subjects there must be pioneers. It has been my lot to be called to this office of hazard and drudgery ; and if in discharging its duties I should meet the fate of my predecessors, in this branch of medicine, I shall not perish in vain. My errors, like the bodies of those who fall in forcing a breach, will serve to compose a bridge for those who shall come after me, in our present difficult enterprise. This consideration, aided by just views of the nature and extent of moral obligation, will overbalance the evils anticipated by Dr. Hunter, from the loss of posthumous fame. Had a prophetic voice whispered in the ear of Dr. Boerhaave in the evening of his life, that in the short period of forty years, the memory of his physiological works would perish from the earth, I am satisfied, from the knowledge we have of his elevated genius and piety, he would have treated the prediction with the same indifference that he would have done, had he been told, that in the same time, his name

should be erased from a pane of glass, in a noisy and vulgar country tavern.

The subjects of the lectures I am about to deliver, you will find in a syllabus which I have prepared and published, for the purpose of giving you a succinct view of the extent and connection of our course. Some of these subjects will be new in lectures upon the institutes of medicine, particularly those which relate to morals, metaphysics, and theology. However thorny these questions may appear, we must approach and handle them ; for they are intimately connected with the history of the faculties and operations of the human mind ; and these, form an essential part of the animal economy. Perhaps it is because physicians have hitherto been restrained from investigating, and deciding upon these subjects, by an erroneous belief that they belong exclusively to another profession, that physiology has so long been an obscure and conjectural science.

In beholding the human body, the first thing that strikes us, is its *life*. This, of course, should be the first object of our inquiries. It is a most important subject ; for the end of all the studies of a physician is to preserve life ; and this cannot be perfectly done, until we know in what it consists.

I include in animal life, as applied to the human body, *motion*, *heat*, *sensation*, and *thought*. These four when united, compose perfect life. It may exist without thought, sensation, or heat, but none of them can exist without motion. The lowest grade of life, probably exists in the absence of even motion, as I shall mention hereafter. I have preferred the term *motion* to those of oscillation and vibration, which have been employed by Dr. Hartley in explaining the laws of animal matter; because I conceived it to be more simple, and better adapted to common apprehension.

In treating upon this subject, I shall first consider animal life as it appears in the waking and sleeping states in a healthy adult, and shall afterwards inquire into the modification of its causes in the foetal, infant, youthful, and middle states of life, in certain diseases, in different states of society, in different climates, and in different animals.

Before I proceed any further, I shall remark, that there are certain grades of matter; and that in all its forms it is necessarily quiescent, or in other words, possesses no self-moving power. Every form of it is moved by a force external to it, and each form has its appropriate or specific stimulus,

or stimuli, from the waves that are moved by the wind, and the sand upon the sea shore which is moved by the waves, up to the human body which is moved by the stimuli to be mentioned presently. From this view of matter, I am naturally led to reject the common division of it into active and passive, or into substances that possess a power to move themselves, and into such as require a power to move them. I believe that animals, like water, earth and air, nay further, that the mind of man are all moved only by their appropriate stimuli ; and that water, earth and air do not become more certainly quiescent from the abstraction of the causes that move them, than motion, heat, sensation and thought cease from the abstraction of impressions upon the human body. The only difference between what is called animated and inanimate matter consists in the stimuli which move the former, acting constantly, and in health, with uniformity ; whereas the stimuli which act upon the latter, act occasionally and with intermissions. However diversified the motions and effects of these stimuli may be, the causes of their motions are exactly the same.

I shall begin by delivering a few general propositions.

I. Every part of the human body (the nails and hair excepted) is endowed with sensibility, or excitability, or with both of them. By sensibility is meant the power of having sensation excited by the action of impressions. Excitability denotes that property in the human body, by which motion is excited by means of impressions. This property has been called by several other names, such as irritability, contractibility, mobility, and stimulability.

I shall make use of the term excitability, for the most part, in preference to any of them. I mean by it, a capacity of imperceptible, as well as obvious motion. It is of no consequence to our present inquiries, whether this excitability be a quality of animal matter, or a substance. The latter opinion has been maintained by Dr. Girtanner, and has some probability in its favour.

II. The whole human body is so formed and connected, that impressions made in the healthy state upon one part, excite motion, or sensation, or both, in every other part of the body. From this view, it appears to be a unit, or a simple and indivisible substance. Its capacity for receiving motion, and sensation, is variously modified by means of what are called the senses. It is external,

and internal. The impressions which act upon it shall be enumerated in order.

III. Certain motions are voluntary, and others are performed in an involuntary manner.

IV. Different parts of the body possess different degrees of what has been called excitability, that is, different degrees of susceptibility to the action of the same stimuli upon them.

V. Life is the *effect* of certain stimuli acting upon the sensibility and excitability which are extended, in different degrees, over every external and internal part of the body. These stimuli are as necessary to its existence, as air is to flame. Animal life is truly (to use the words of Dr. Brown) "a forced state." I have said the *words* of Dr. Brown; for the opinion was delivered by Dr. Cullen in the university of Edinburgh, in the year 1766, and was detailed by me in this school, many years before the name of Dr. Brown was known as a teacher of medicine. It is true, Dr. Cullen afterwards deserted it; but it is equally true, I never did; and the belief of it has been the foundation of many of the principles and modes of practice in medicine which I have since adopted. In a lecture which I delivered in the year 1771, I

find the following words, which are taken from a manuscript copy of lectures given by Dr. Cullen upon the institutes of medicine. "The human body is not an automaton, or self-moving machine; but is kept alive and in motion, by the constant action of stimuli upon it." In thus ascribing the discovery of the cause of life which I shall endeavour to establish, to Dr. Cullen, let it not be supposed I mean to detract from the genius and merit of Dr. Brown. To his intrepidity in reviving and propagating it, as well as for the many other truths contained in his system of medicine, posterity, I have no doubt, will do him ample justice, after the errors that are blended with them have been corrected, by their unsuccessful application to the cure of diseases.

Agreeably to our last proposition, I proceed to remark, that the action of the brain, the diastole and systole of the heart, the pulsation of the arteries, the contraction of the muscles, the peristaltic motion of the bowels, the absorbing power of the lymphatics, secretion, excretion, hearing, seeing, smelling, taste, and the sense of touch, nay more, thought itself, are all the effects of stimuli acting upon the organs of sense and motion. These stimuli have been divided into external and internal. The external are light, sound, odours, air, heat,

exercise, and the pleasures of the senses. The internal stimuli are food, drinks, chyle, the blood, a certain tension of the glands, which contain secreted liquors, and the exercises of the faculties of the mind ; each of which I shall treat in the order in which they have been mentioned.

I. Of external stimuli. The *first* of these is Air. In support of this opinion, I shall produce the highest authority, and that is, the history of the creation of man, as recorded in the second chapter of the book of Genesis. For this purpose, I beg you would accompany me in your imaginations to the garden of Eden, the birth place of the great progenitor of the human race. In the midst of this garden, behold a human figure ! Let us approach it : How exquisitely formed are its head, its body, and its limbs ! All is symmetry and beauty ! Let us approach still nearer, and examine it by the aid of all our senses. It is motionless as the earth upon which it stands. Its external surface is cold, but soft. Its well formed face is pale, and its eyes, mouth, and nostrils are all closed. But who is that august figure that with slow and majestic steps advances towards it ? It is its Creator in a human shape. Let us retire a little to make room for him to come nearer to the beautiful workmanship of his divine hands. What follows ? Let the inspired

historian tell us. "And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life, and man became a living soul."* The common explanation of this passage of Scripture is, that God, in this act, infused a soul into the torpid, or lifeless body of Adam, and that his soul became its principle of life, or in other words, that he thus changed a dead mass of animalized matter, into an animated being. That this was not the case, I infer, not only from the existence of life in many persons in whom the soul is in a dormant or torpid state from diseases in the brain, but from a more liberal and correct translation of the above passage of scripture, in which I am warranted by several Hebrew scholars in our city, alike eminent for their learning and piety. It is as follows. "And the Lord God breathed into his nostrils, the *air of lives*, and he became a living soul." That is, he dilated his nostrils, and thereby inflated his lungs with air, and thus excited in him, animal, intellectual and spiritual life, in consequence of which he became an animated human creature. From this view of the origin of life in Adam, it appears that his soul and body were cast in the same mould, and at the same time, and that both were animated by the same act of Divine

* Verse 7.

power by means of the same stream of air. The resuscitation of the body after appearing to be dead, by means of stimuli, more especially by the stimulus of air, favours the explanation I have given of the beginning of life in man. The air thus infused into his lungs, by expanding and stimulating them, communicated action, first to the heart, the heart moved the quiescent blood, the blood moved the quiescent brain, the brain moved the quiescent mind, the eyes and the mouth are now opened, the blood pervades the capillary vessels of the face, and discharges a part of the paleness from it; his skin becomes warm; his will, the great executive faculty of the mind, begins to act; other stimuli co-operate with the action of the air; behold! he moves, he walks, he is perfectly, and universally animated. Thus gentlemen I believe began the life of man.

That the air, by exciting respiration, gave the first impulse of life to the body and mind of Adam, and that it is essential to it, I infer from many passages in the Old and New Testaments, besides the one I have mentioned. I shall enumerate a few of them.

1. The dry bones seen by Ezekiel in a vision, when brought together, were devoid of life, until the winds are invoked to inflate their lungs with

air.* Immediately afterwards they became living and intelligent beings.

2. Job places the life of the whole human race in their breath. Hence he says, “ In whose hand (meaning the Deity’s) is the soul of every living creature, and the breath of all mankind.”† Again he says, “ The Spirit of the Lord hath made me, and the breath of the Almighty hath given me life.‡

3. St. Paul in his famous sermon preached at Athens, makes life and breath synonymous ; hence he says, “ He (meaning the Creator of the world) giveth to all, life and breath.”§

The intimate and indissoluble connection between breath or air, and life, is established still further by the connection which the scriptures hold forth between the absence of breath, or air, and the presence of death.

4. The son of the widow of Zarephath is said to die, when “ his sickness was so sore, that there was no breath left in him.”||

* Chap. xxxvii. † Chap. xiii. 10. ‡ Chap. xxxiii. 4.

§ Acts xvii. 25.

|| 1 Kings xvii. 17.

5. The author of the 164th Psalm says, "Thou hidest thy face, they are troubled; thou takest away their breath; they die, and return to their dust."* Again, the author of the 146th Psalm, in speaking of the death of man, says, "His breath goeth forth, he returneth to his earth; in that very day his thoughts perish."†

Exactly in the same way in which I have supposed life began in the first man in the garden of Eden, does it begin in every child that comes into the world. The first portion of air that rushes into its lungs, sets them in motion. They move the heart....hence they have been called "cordis flabellum," or "ventilabrum," that is, the bellows of the heart....the heart moves the brain; the brain gradually awakens and moves the mind; and both brain and mind by their re-action, move every other part of the body. The first impression of air upon the lungs of a new born infant is painful, and hence its cries give the first notice of the passage of its head into the world. It is probable the action of air upon its body likewise excites pain, and that the red colour of its skin, may be the effect of it. This sensation of pain is soon destroyed by habit, and from the operation of a kind law in the

* Verse 29.

† Verse 4.

animal economy, it is afterwards followed by a sense of pleasure. Respiration for a while in a new born infant is at first altogether involuntary. The heart moves in like manner from the effects of respiration upon it. After some time the will acquires, from the influence of habit, a partial voluntary power over the lungs, but the heart continues to move through every stage of life, only in consequence of the perpetual impressions which are made upon it. Its action is therefore very properly said to be altogether involuntary.

That an action originally involuntary may become voluntary, and that actions originally voluntary may become involuntary, from habit, is obvious from many facts. The former appears not only in respiration, but in the command which all men acquire over their arms and legs and over the spincters of the rectum and bladder, and which some men acquire over their stomachs and diaphragms, so as to puke and hiccup at their pleasure, while the latter appears in many diseases, and, as I shall say hereafter, in the last hours of life. Convulsions in a limb, or muscle, are a striking proof of this change of a voluntary into an involuntary action. The same things appear in the tremors in the limbs in old people, and in the fatal

consequences which frequently attend their falling down in walking. The whole weight of their heads and bodies generally strikes the ground, and that from the loss of the power of their wills over their arms, which by being protruded, break the force of a fall in early and middle life.

I shall hereafter add a number of facts from the history of life in other animals, which will, I hope, support the important office I have ascribed to the air in imparting the first impulse to life in the human species.

2. Light appears to occupy the next grade to air, in the production of animal life. It is remarkable that the progenitor of the human race was not brought into existence until all the luminaries of heaven were created. Light acts chiefly through the medium of the organs of vision. Its influence upon animal life is feeble, compared with some other stimuli to be mentioned hereafter; but it has its proportion of force. Sleep has been said to be a tendency to death; now the absence of light we know invites to sleep, and the return of it excites the waking state. The late Mr. Rittenhouse informed me, that for many years he had constantly awoke with the first dawn of the morning light, both in summer and winter. Its influ-

ence upon the animal spirits strongly demonstrates its connection with animal life, and hence we find a cheerful and a depressed state of mind in many people, and more especially in invalids, to be intimately connected with the presence or absence of the rays of the sun. The well-known pedestrian traveller, Mr. Stewart, in one of his visits to this city, informed me, that he had spent a summer in Lapland, in the latitude of 69° , during the greatest part of which time the sun was seldom out of sight. He enjoyed, he said, during this period, uncommon health and spirits, both of which he ascribed to the long duration, and invigorating influence of light. These facts will surprise us less when we attend to the effects of light upon vegetables. Some of them lose their colour by being deprived of it; many of them discover a partiality to it in the direction of their flowers; and all of them discharge their pure air only while they are exposed to it.*

* Organization, sensation, spontaneous motion, and life, exist only at the surface of the earth, and in places exposed to *light*. We might affirm the flame of Prometheus's torch was the expression of a philosophical truth that did not escape the ancients. Without light, nature was lifeless, inanimate, and dead. A benevolent God, by producing life, has spread organization, sensation, and thought over the surface of the earth."—*Lavoisier*.

3. Sound has an extensive influence upon human life. Its numerous artificial and natural sources need not be mentioned. I shall only take notice, that the currents of winds, the passage of insects through the air, and even the growth of vegetables, are all attended with an emission of sound; and although they become imperceptible from habit, yet there is reason to believe they all act upon the body, through the medium of the ears. The existence of these sounds is established by the reports of persons who have ascended two or three miles from the earth in a balloon. They tell us that the silence which prevails in those regions of the air is so new and complete, as to produce an awful solemnity in their minds. It is not necessary that these sounds should excite sensation or perception, in order to their exerting a degree of stimulus upon the body. There are a hundred impressions daily made upon it, which from habit are not followed by sensation. The stimulus of aliment upon the stomach, and of blood upon the heart and arteries, probably cease to be felt, only from the influence of habit. The exercise of walking, which was originally the result of a deliberate act of the will, is performed from habit without the least degree of consciousness. It is unfortunate for this, and many other parts of physiology, that we

forget what passed in our minds the first two or three years of our lives. Could we recollect the manner in which we acquired our first ideas, and the progress of our knowledge with the evolution of our senses and faculties, it would relieve us from many difficulties and controversies upon this subject. Perhaps this forgetfulness by children, of the origin and progress of their knowledge, might be remedied by our attending more closely to the first effects of impressions, sensation, and perception upon them, as discovered by their little actions ; all of which probably have a meaning, as determined as any of the actions of men or women.

The influence of sounds of a certain kind in producing excitement, and thereby increasing life, cannot be denied. Fear produces debility, which is a tendency to death. Sound obviates this debility, and thus restores the system to the natural and healthy grade of life. The school-boy and the clown invigorate their feeble and trembling limbs by whistling or singing as they pass by a country church-yard, and the soldier feels his departing life recalled in the onset of a battle by the noise of the fife, and of the poet's "spirit stirring drum." Intoxication is frequently attended with a higher degree of life than is natural. Now sound we know will produce this with a very moderate portion of

fermented liquor; hence we find men are more easily and highly excited by it at public entertainments where there is music, loud talking, and hallooing, than in private companies where there is no auxiliary stimulus added to that of the wine. I wish these effects of sound upon animal life to be remembered; for I shall mention it hereafter as a remedy for the weak state of life in many diseases, and shall relate an instance in which a scream suddenly extorted by grief, proved the means of resuscitating a person who was supposed to be dead, and who had exhibited the usual recent marks of the extinction of life.

I shall conclude this head by remarking, that persons who are destitute of hearing and seeing possess life in a more languid state than other people; and hence arise the dulness and want of spirits which they discover in their intercourse with the world.

4. Odours have a sensible effect in promoting animal life. The greater healthiness of the country, than cities, is derived in part from the effluvia of odoriferous plants, which float in the atmosphere in the spring and summer months, acting upon the system, through the medium of the sense of smelling. The effects of odours upon animal life

appear still more obvious in the sudden revival of it, which they produce in cases of fainting. Here the smell of a few drops of hartshorn, or even of a burnt feather, has frequently in a few minutes restored the system, from a state of weakness bordering upon death, to an equable and regular degree of excitement.

5. Heat is a uniform and active stimulus in promoting life. It is derived, in certain seasons and countries, in part from the sun; but its principal source is from that cause whatever it may be, which produces animal heat. The extensive influence of heat upon animal life, is evident from its decay and suspension during the winter in certain animals, and from its revival upon the approach and action of the vernal sun. It is true, life is diminished much less in man, from the distance and absence of the sun, than in other animals; but this must be ascribed to his possessing reason in so high a degree, as to enable him to supply the abstraction of heat, by the action of other stimuli upon his system.

6. Exercise acts as a stimulus upon the body in various ways. Its first impression is upon the muscles. These act upon the blood-vessels, and they upon the nerves and brain. The necessity of ex-

ercise to animal life is indicated, by its being kindly imposed upon man in paradise. The change which the human body underwent by the fall, rendered the same salutary stimulus necessary to its life, in the more active form of labour. But we are not to suppose, that motion is excited in the body by exercise or labour alone. It is constantly stimulated by the positions of standing, sitting, and lying upon the sides ; all of which act more or less upon muscular fibres, and by their means, upon every part of the system.

7. The pleasures we derive from our senses have a powerful and extensive influence upon human life. The number of these pleasures, and their proximate cause, will form an agreeable subject for two or three future lectures.

We proceed next to consider the internal stimuli which produce animal life. These are

1. Food. This acts in the following ways. 1. Upon the tongue. Such are the sensibility and excitability of this organ, and so intimate is its connection with every other part of the body, that the whole system is invigorated by aliment, as soon as it comes in contact with it. 2. By mastication. This moves a number of muscles and blood-ves-

sels situated near the brain and heart, and of course imparts impressions to them. 3. By deglutition, which acts upon similar parts, and with the same effect. 4. By its presence in the stomach, in which it acts by its quantity and quality. Food, by distending the stomach, stimulates the contiguous parts of the body. A moderate degree of distention of the stomach and bowels is essential to a healthy excitement of the system. Vegetable aliment and drinks, which contain less nourishment than animal food, serve this purpose in the human body. Hay acts in the same manner in a horse. Sixteen pounds of this light food in a day are necessary to keep up such a degree of distention in the stomach and bowels of this animal, as to impart to him his natural grade of strength and life. The *quality* of food, when of a stimulating nature, supplies the place of its distention from its quantity. A single onion will support a lounging highlander on the hills of Scotland for four and twenty hours. A moderate quantity of salted meat, or a few ounces of sugar, have supplied the place of pounds of less stimulating food. Even indigestible substances, which remain for days, or perhaps weeks in the stomach, exert a stimulus there which has an influence upon animal life. It is in this way the tops of briars, and the twigs of trees, devoid not only

of nourishing matter, but of juices, support the camel in his journies through the deserts of the eastern countries. Chips of cedar posts moistened with water have supported horses for two or three weeks, during a long voyage from Boston to Surinam; and the indigestible cover of an old Bible preserved the life of a dog, accidentally confined in a room at Newcastle upon Tyne, for twenty days.

5. Food stimulates the whole body by means of the process of digestion which goes forward in the stomach. This animal function is carried on by a process, in which there is probably an extrication of heat and air. Now both these, it has been remarked, exert a stimulus in promoting animal life.

Drinks, when they consist of fermented or distilled liquors, stimulate from their quality; but when they consist of water, either in its simple state, or impregnated with any sapid substance, they act principally by distention.

II. The chyle acts upon the lacteals, mesenteric glands, and thoracic duct, in its passage through them; and it is highly probable, its first mixture with the blood in the subclavian vein, and its first action on the heart, are attended with considerable stimulating effects.

III. The blood is a very important internal stimulus. It has been disputed whether it acts by its quality, or only by distending the blood-vessels. It appears to act in both ways. I believe with Dr. Whytt, that the blood stimulates the heart and arteries by a specific action. But if this be not admitted, its influence in extending the blood-vessels in every part of the body, and thereby imparting extensive and uniform impressions to every animal fibre, cannot be denied. In support of this assertion it has been remarked, that in those persons who die of hunger, there is no diminution of the quantity of blood in the large blood-vessels.

IV. A certain *tension* of the glands, and of other parts of the body, contributes to support animal life. This is evident in the vigour which is imparted to the system, by the fulness of the seminal vesicles and gall bladder, and by the distention of the uterus in pregnancy. This distention is so great, in some instances, as to prevent sleep for many days and even weeks before delivery. It serves the valuable purpose of rendering the female system less liable to death during its continuance, than at any other time. By increasing the quantity of life in the body, it often suspends the fatal issue of pulmonary consumption, and ensures a temporary victory over the plague and other malignant

fevers; for death, from those diseases, seldom takes place, until the stimulus, from the distention of the uterus, is removed by parturition.

V. The exercises of the faculties of the mind have a wonderful influence in increasing the quantity of human life. They all act by *reflection* only, after having been previously excited into action by impressions made upon the body. This view of the *re-action* of the mind upon the body accords with the simplicity of other operations in the animal economy. It is thus the brain repays the heart for the blood it conveys to it, by re-acting upon its muscular fibres. The influence of the different faculties of the mind is felt in the pulse, in the stomach, and in the liver, and is seen in the face, and other external parts of the body. Those which act most unequivocally in promoting life are the understanding, the imagination, and the passions. Thinking belongs to the understanding, and is attended with an obvious influence upon the degree and duration of life. Intense study has often rendered the body insensible to the debilitating effects of cold and hunger. Men of great and active understandings, who blend with their studies temperance and exercise, are generally long lived. In support of this assertion, a hundred names might be added to those of Newton and Franklin. Its

truth will be more fully established by attending to the state of human life in persons of an opposite intellectual character. The Cretins, a race of idiots in Valais, in Switzerland, travellers tell us, are all short lived. Common language justifies the opinion of the stimulus of the understanding upon the brain : hence it is common to say of dull men, that they have scarcely ideas enough to keep themselves awake.

The imagination acts with great force upon the body, whether its numerous associations produce pleasure or pain. But the passions pour a constant stream upon the wheels of life. They have been subdivided into emotions and passions properly so called. The former have for their objects present, the latter, future good and evil. All the objects of the passions are accompanied with desire or aversion. To the former belong chiefly, hope, love, ambition, and avarice ; to the latter, fear, hatred, malice, envy, and the like. Joy, anger, and terror, belong to the class of emotions. The passions and emotions have been further divided into stimulating and sedative. Our business at present is to consider their first effect only upon the body. In the original constitution of human nature, we were made to be stimulated by such passions and emotions only as have moral good for their objects.

Man was designed to be always under the influence of hope, love, and joy. By the loss of his innocence, he has subjected himself to the dominion of passions and emotions of a malignant nature ; but they possess, in common with such as are good, a stimulus which renders them subservient to the purpose of promoting animal life. It is true, they are like the stimulus of a dislocated bone in their operation upon the body, compared with the action of antagonist muscles stretched over bones, which gently move in their natural sockets. The effects of the good passions and emotions, in promoting health and longevity, have been taken notice of by many writers. They produce a flame, gentle and pleasant, like oil perfumed with frankincense, in the lamp of life. There are instances likewise of persons who have derived strength and long life from the influence of the evil passions and emotions that have been mentioned. Dr. Darwin relates the history of a man, who used to overcome the fatigue induced by travelling, by thinking of a person whom he hated. The debility induced by disease is often removed by a sudden change in the temper. This is so common, that even nurses predict a recovery in persons as soon as they become peevish and ill-natured, after having been patient during the worst stage of their sickness. This peevishness acts as a gentle stimulus upon

the system in its languid state, and thus turns the scale in favour of life and health. The famous Benjamin Lay, of this state, who lived to be eighty years of age, was of a very irascible temper. Old Elwes was a prodigy of avarice, and every court in Europe furnishes instances of men who have attained to extreme old age, who have lived constantly under the dominion of ambition. In the course of a long inquiry which I instituted some years ago into the state of the body and mind in old people, I did not find a single person above eighty, who had not possessed an active understanding, or active passions. Those different and opposite faculties of the mind, when in excess, happily supply the place of each other. Where they unite their forces, they extinguish the flame of life, before the oil which feeds it is consumed.

In another place I shall resume the influence of the faculties of the mind upon human life, as they discover themselves in the different pursuits of men.

I have only to add here, that I see no occasion to admit, with the followers of Dr. Brown, that the mind is active in sleep, in preserving the motions of life. I hope to establish hereafter the opinion of Mr. Locke, that the mind is always passive in sound sleep. It is true it acts in dreams;

but these depend upon a morbid state of the brain, and therefore do not belong to the present stage of our subject, for I am now considering animal life only in the healthy state of the body. I shall say presently, that dreams are intended to supply the absence of some natural stimulus, and hence we find they occur in those persons most commonly, in whom there is a want of healthy action in the system, induced by the excess or deficiency of customary stimuli.

Life is in a languid state in the morning. It acquires vigour by the gradual and successive application of stimuli in the forenoon. It is in its most perfect state about mid-day, and remains stationary for some hours. From the diminution of the sensibility and contractility of the system to the action of impressions, it lessens in the evening, and becomes again languid at bed-time. These facts will admit of an extensive application hereafter in our lectures upon the practice of physic.

LECTURE II.

GENTLEMEN,

THE stimuli which have been enumerated, when they act collectively, and within certain bounds, produce a healthy waking state. But they do not always act collectively, nor in the determined and regular manner that has been described. There is, in many states of the system, a deficiency of some stimuli, and, in some of its states, an apparent absence of them all. To account for the continuance of animal life under such circumstances, two things must be premised, before we proceed to take notice of the diminution or absence of the stimuli which support it.

1. The healthy actions of the body in the waking state consist in a proper degree of what has been called excitability and excitement. The former is the medium on which stimuli act in producing the latter. In an exact proportion, and a due relation of both, diffused uniformly throughout every part of the body, consists good health. Dis-

ease is the reverse of this. It depends *in part* upon a disproportion between excitement and excitability, and in a partial distribution of each of them. In thus distinguishing the different states of excitement and excitability in health and sickness, you see I dissent from Dr. Brown, who supposes them to be (though disproportioned to each other) equally diffused in the morbid, as well as the healthy state of the body.

2. It is a law of the system, that the absence of one natural stimulus is generally supplied by the increased action of others. This is more certainly the case where a natural stimulus is abstracted *suddenly*; for the excitability is thereby so instantly formed and accumulated, as to furnish a highly sensible and moveable surface for the remaining stimuli to act upon. Many proofs might be adduced in support of this proposition. The reduction of the excitement of the blood-vessels, by means of cold, prepares the way for a full meal, or a warm bed, to excite in them the morbid actions which take place in a pleurisy or a rheumatism. A horse in a cold stable eats more than in a warm one, and thus counteracts the debility which would otherwise be induced upon his system, by the abstraction of the stimulus of warm air.

These two propositions being admitted, I proceed next to inquire into the different degrees and states of animal life. The first departure from its ordinary and perfect state which strikes us, is in

1. Sleep. This is either natural or artificial. Natural sleep is induced by a diminution of the excitement and excitability of the system, by the continued application of the stimuli which act upon the body in its waking state. When these stimuli act in a determined degree, that is, when the same number of stimuli act with the same force, and for the same time, upon the system, sleep will be brought on at the same hour every night. But when they act with uncommon force, or for an unusual time, it is brought on at an earlier hour. Thus a long walk or ride, by persons accustomed to a sedentary life, unusual exercise of the understanding, the action of strong passions or emotions, and the continual application of unusual sounds seldom fail of inducing premature sleep. It is recorded of pope Ganganelli, that he slept more soundly, and longer than usual, the night after he was raised to the papal chair. The effects of unusual sounds in bringing on premature sleep, is further demonstrated by that constant inclination to retire to bed at an early hour, which country

people discover the first and second days they spend in a city, exposed from morning till night to the noise of hammers, files, and looms, or of drays, carts, waggons, and coaches, rattling over pavements of stone. Sleep is further hastened by the absence of light, the cessation of sounds and labour, and the recumbent posture of the body on a soft bed.

Artificial sleep may be induced at any time by certain stimulating substances, particularly by opium. They act by carrying the system beyond the healthy grade of excitement, to a degree of depression, which Dr. Brown has happily called the sleeping point. The same point may be induced in the system at any time by the artificial abstraction of the usual stimuli of life. For example, let a person shut himself up at mid-day in a dark room, remote from noise of all kinds, let him lie down upon his back upon a soft bed in a temperate state of the atmosphere, and let him cease to think upon interesting subjects, or let him think only upon one subject, and he will soon fall asleep. Dr. Boerhaave relates an instance of a Dutch physician, who, having persuaded himself that waking was a violent state, and sleep the only natural one of the system, contrived, by abstracting every kind of stimulus in the manner that has been mentioned,

to sleep away whole days and nights, until at length he impaired his understanding, and finally perished in a public hospital in a state of idiotism.

In thus anticipating a view of the cause of sleep, I have said nothing of the effects of diseases of the brain in inducing it. These belong to another part of our course. The short explanation I have given of its cause was necessary in order to render the history of animal life, in that state of the system, more intelligible.

At the usual hour of sleep there is an abstraction of the stimuli of light, sound, and muscular motion. The stimuli which remain, and act with an increased force upon the body in sleep, are

1. The heat which is discharged from the body, and confined by means of bed-clothes. It is most perceptible when exhaled from a bed-fellow. Heat obtained in this way has sometimes been employed to restore declining life to the bodies of old people. Witness the damsel who lay for this purpose in the bosom of the king of Israel. The advantage of this external heat will appear further, when we consider how impracticable or imperfect sleep is, when we lie under too light covering in cold weather.

2. The air which applied to the lungs during sleep probably acts with more force than in the waking state. I am disposed to believe that more air is phlogisticated in sleep than at any other time, for the smell of a close room in which a person has slept one night, we know, is much more disagreeable than that of a room, under equal circumstances, in which half a dozen people have sat for the same number of hours in the day time. The action of decomposed air on the lungs and heart was spoken of in a former lecture. An increase in its quantity must necessarily have a powerful influence upon animal life during the sleeping state.

3. Respiration is performed with a greater extension and contraction of the muscles of the breast in sleep than in the waking state ; and this cannot fail of increasing the impetus of the blood in its passage through the heart and blood-vessels. The increase of the fulness and force of the pulse in sleep, is probably owing in part to the action of respiration upon it. In another place I hope to elevate the rank of the blood-vessels in the animal economy, by showing that they are the fountains of power in the body. They derive this pre-eminence from the protection and support they afford to every part of the system. They are the perpe-

tual centinels of health and life ; for they never partake in the repose which is enjoyed by the muscles and nerves. During sleep, their sensibility seems to be converted into contractility, by which means their muscular fibres are more easily moved by the blood than in the waking state. The diminution of sensibility in sleep is proved by many facts to be mentioned hereafter ; and the change of sensibility into contractility will appear, when we come to consider the state of animal life in infancy and old age.

4. Aliment in the stomach acts more powerfully in sleep than in the waking state. This is evident from digestion going on more rapidly when we are awake than when we sleep. The more slow the digestion, the greater is the stimulus of the aliment in the stomach. Of this we have many proofs in daily life. Labourers object to milk as a breakfast, because it digests too soon ; and often call for food in a morning, which they can feel all day in their stomachs. Sausages, fat pork, and onions are generally preferred by them for this purpose. A moderate supper is favourable to easy and sound sleep ; and the want of it, in persons who are accustomed to that meal, is often followed by a restless night. The absence of its stimulus is probably supplied by a full gall-bladder (which al-

ways attends an empty stomach) in persons who are not in the habit of eating suppers.

5. The stimulus of the urine, accumulated in the bladder during sleep, has a perceptible influence upon animal life. It is often so considerable as to interrupt sleep ; and it is one of the causes of our waking at a regular hour in the morning. It is moreover a frequent cause of the activity of the understanding and passions in dreams ; and hence we dream more in our morning slumbers, when the bladder is full, than we do in the beginning or middle of the night.

6. The fæces exert a constant stimulus upon the bowels in sleep. This is so considerable as to render it less profound when they have been accumulated for two or three days, or when they have been deposited in the extremity of the alimentary canal.

7. The partial and irregular exercises of the understanding and passions in dreams have an occasional influence in promoting life. They occur only where there is a deficiency of other stimuli. Such is the force with which the mind acts upon the body in dreams, that Dr. Brambilla, physician to the emperor of Germany, informs us, that he has seen instances of wounds in soldiers being inflamed, and

putting on a gangrenous appearance in consequence of the commotions excited in their bodies by irritating dreams.* The stimulating passions act through the medium of the will; and the exercises of this faculty of the mind sometimes extend so far as to produce actions in the muscles of the limbs, and occasionally in the whole body, as we see in persons who walk in their sleep. The stimulus of lust often awakens us with pleasure or pain, according as we are disposed to respect or disobey the precepts of our Maker. The angry and revengeful passions often deliver us, in like manner, from the imaginary guilt of murder. Even the debilitating passions of grief and fear produce an indirect operation upon the system that is favourable to life in sleep, for they excite that distressing disease called the night-mare, which prompts us to speak, or halloo, and by thus invigorating respiration, overcomes the languid circulation of the blood in the heart and brain. Do not complain then, gentlemen, when you are bestrode by this midnight hag. She is

* A fever was excited in Cinna the poet, in consequence of his dreaming that he saw Cæsar, the night after he was assassinated, and was invited to accompany him to a dreary place, to which he pointed, in order to sup with him. Convulsions, and other diseases, I believe, are often excited in the night, by terrifying or distressing dreams.

Plutarch's Life of M. Brutus.

kindly sent to prevent your sudden death. Persons who go to bed in good health, and are found dead the succeeding morning, are said most commonly to die of this disease.

I proceed now to inquire into the state of animal life in its different stages. I pass over for the present its history in generation. It will be sufficient only to remark in this place, that its first motion is produced by the stimulus of the male seed upon the female ovum. This opinion is not originally mine. You will find it in Dr. Haller.* The pungent taste which Mr. John Hunter discovered in the male seed renders it peculiarly fit for this purpose. No sooner is the female ovum thus set in motion, and the foetus formed, than its capacity of life is supported,

1. By the stimulus of the heat which it derives from its connection with its mother in the womb.

2. By the stimulus of its own circulating blood.

3. By its constant motion in the womb after the third month of pregnancy. The absence of this

* "Novum foetus a seminis masculi *stimulo* vitam concepisse."—*Elementa Physiologiæ*, vol. viii. p. 177.

motion for a few days is always a sign of the indisposition or death of a fœtus. Considering how early a child is accustomed to it, it is strange that a cradle should ever have been denied to it after it comes into the world.

II. In infants there is an absence of many of the stimuli which support life. Their excretions are in a great measure deficient in acrimony, and their mental faculties are too weak to exert much influence upon their bodies. But the absence of stimulus from those causes is amply supplied.

1. By the very great excitability of their systems to those of light, sound, heat, and air. So powerfully do light and sound act upon them, that the Author of nature has kindly defended their eyes and ears from an excess of their impressions by imperfect vision and hearing, for several weeks after birth. The capacity of infants to be acted upon by moderate degrees of heat is evident from their suffering less from cold than grown people. This is so much the case, that we read, in Mr. Umfreville's account of Hudson's Bay, of a child that was found alive upon the back of its mother after she was frozen to death. I before hinted at the action of the air upon the bodies of new-born infants in producing the red colour of their skins. It

is highly probable (from a fact formerly mentioned) that the first impression of the atmosphere which produces this redness is accompanied with pain, and this we know is a stimulus of a very active nature. By a kind law of sensation, impressions, that were originally painful, become pleasurable by repetition or duration. This is remarkably evident in the impression now under consideration, and hence we find infants at a certain age discover signs of an increase of life by their delightful gestures, when they are carried into the open air. Recollect further, gentlemen, what was said formerly of excitability predominating over sensibility in infants. We see it daily, not only in their patience of cold, but in the short time in which they cease to complain of the injuries they meet with from falls, cuts, and even severe surgical operations.

2. Animal life is supported in infants by their sucking, or feeding, nearly every hour in the day and night when they are awake. I explained formerly the manner in which food stimulated the system. The action of sucking supplies, by the muscles employed in it, the stimulus of mastication.

3. Laughing and crying, which are universal in infancy, have a considerable influence in promoting animal life, by their action upon respiration, and

the circulation of the blood. Laughing exists under all circumstances, independently of education or imitation. The child of the negro slave, born only to inherit the toils and misery of its parents, receives its master with a smile every time he enters his kitchen or a negro-quarter. But laughing exists in infancy under circumstances still more unfavourable to it; an instance of which is related by Mr. Bruce. After a journey of several hundred miles across the sands of Nubia, he came to a spring of water shaded by a few scrubby trees. Here he intended to have rested during the night, but he had not slept long before he was awakened by a noise which he perceived was made by a solitary Arab, equally fatigued and half famished with himself, who was preparing to murder and plunder him. Mr. Bruce rushed upon him, and made him his prisoner. The next morning he was joined by a half-starved female companion, with an infant of six months old in her arms. In passing by this child, Mr. Bruce says, it laughed and crowed in his face, and attempted to leap upon him. From this fact it would seem as if laughing was not only characteristic of our species, but that it was early and intimately connected with human life. The child of these Arabs had probably never seen a smile upon the faces of its ferocious parents and

perhaps had never (before the sight of Mr. Bruce) beheld any other human creature.

Crying has a considerable influence upon health and life in children. I have seen so many instances of its salutary effects, that I have satisfied myself it is as possible for a child to "cry and be fat," as it is to "laugh and be fat."

4. As children advance in life, the constancy of their appetites for food, and their disposition to laugh and cry, lessen, but the diminution of these stimuli is supplied by exercise. The limbs* and tongues of children are always in motion. They continue likewise to eat oftener than adults. A crust of bread is commonly the last thing they ask for at night, and the first thing they call for in the morning. It is now they begin to feel the energy of their mental faculties. This stimulus is assisted in its force by the disposition to prattle, which is so universal among children. This habit of converting their ideas into words as fast as they rise, follows them to their beds, where we often hear

* Niebuhr, in his Travels, says the children in Arabia are taught to keep themselves constantly in motion by a kind of vibratory exercise of their bodies. This motion counteracts the diminution of life produced by the heat of the climate of Arabia.

them talk themselves to sleep in a whisper, or to use less correct, but more striking terms, by *thinking aloud*.

5. Dreams act at an early period upon the bodies of children. Their smiles, startings, and occasional screams in their sleep appear to arise from them. After the third or fourth year of their lives, they sometimes confound them with things that are real. From observing the effects of this mistake upon the memory, a sensible woman whom I once knew, forbad her children to tell their dreams, lest they should contract habits of lying, by confounding imaginary with real events.

6. New objects, whether natural or artificial, are never seen by children without emotions of pleasure which act upon their capacity of life. The effects of novelty upon the tender bodies of children may easily be conceived, by its friendly influence upon the health of invalids who visit foreign countries, and who pass months or years in a constant succession of new and agreeable impressions.

III. From the combination of all the stimuli that have been enumerated, human life is generally in excess from fifteen to thirty-five. It is during this

period the passions blow a perpetual storm. The most predominating of them is the love of pleasure. No sooner does the system become insensible to this stimulus, than ambition succeeds it in,

IV. The middle stage of life. Here we behold man in the most perfect physical state. The stimuli which now act upon him are so far regulated by prudence, that they are seldom excessive in their force. The habits of order the system acquires in this period, continue to produce good health for many years afterwards; and hence bills of mortality prove that fewer persons die between forty and fifty-seven, than in any other seventeen years of human life.

V. In old age, the senses of seeing, hearing, and touch are impaired. The venereal appetite is weakened, or entirely extinguished. The pulse becomes slow, and subject to frequent intermissions, from a decay in the force of the blood-vessels. Exercise becomes impracticable, or irksome, and the operations of the understanding are performed with languor and difficulty. In this shattered and declining state of the system, the absence and diminution of all the stimuli which have been mentioned are supplied,

1. By an increase in the quantity, and by the peculiar quality of the food, which is taken by old people. They generally eat twice as much as persons in middle life, and they bear with pain the usual intervals between meals. They moreover prefer that kind of food which is savoury and stimulating. The stomach of the celebrated Parr, who died in the one hundred and fiftieth year of his age, was found full of strong, nourishing aliment.

2. By the stimulus of the fæces, which are frequently retained for five or six days in the bowels of old people.

3. By the stimulus of fluids rendered preternaturally acrid by age. The urine, sweat, and even the tears of old people, possess a peculiar acrimony. Their blood likewise loses part of the mildness which is natural to that fluid; and hence the difficulty with which sores heal in old people; and hence too the reason why cancers are more common in the decline, than in any other period of human life.

4. By the uncommon activity of certain passions. These are either good or evil. To the former belong an increased vigour in the operations of those

passions which have for their objects the Divine Being, or the whole family of mankind, or their own offspring, particularly their grand-children. To the latter passions belong malice, a hatred of the manners and fashions of the rising generation, and, above all, avarice. This passion knows no holidays. Its stimulus is constant, though varied daily by the numerous means which it has discovered of increasing, securing, and perpetuating property. It has been observed that weak mental impressions produce much greater effects in old people than in persons in middle life. A trifling indisposition in a grand-child, an inadvertent act of unkindness from a friend, or the fear of losing a few shillings, have, in many instances, produced in them a degree of wakefulness that has continued for two or three nights. It is to this highly excitable state of the system that Solomon probably alludes, when he describes the grasshopper as burdensome to old people.

5. By the passion for talking, which is so common, as to be one of the characteristics of old age. I mentioned formerly the influence of this stimulus upon animal life. Perhaps it is more necessary in the female constitution than in the male ; for it has long ago been remarked, that women who are very taciturn are generally unhealthy.

6. By their wearing warmer clothes, and preferring warmer rooms, than in the former periods of their lives. This practice is so uniform, that it would not be difficult, in many cases, to tell a man's age by his dress, or by finding out at what degree of heat he found himself comfortable in a close room.

7. By dreams. These are universal among old people. They arise from their short and imperfect sleep.

8. It has been often said, that "We are once men, and twice children." In speaking of the state of animal life in infancy, I remarked that the contractility of the animal fibres predominated over their sensibility in that stage of life. The same thing takes place in old people, and it is in consequence of the return of this infantile state of the system, that all the stimuli which have been mentioned act upon them with much more force than in middle life. This sameness, in the predominance of excitability over sensibility in children and old people, will account for the similarity of their habits with respect to eating, sleep, exercise, and the use of fermented and distilled liquors. It is from the increase of excitability in old people, that so small a quantity of strong drink intoxicates them; and it

is from an ignorance of this change in their constitutions, that many of them become drunkards, after passing the early and middle stages of life with sober characters.

Life is continued in a less imperfect state in old age in women than in men. The former sew, and knit, and spin, after they lose the use of their ears and eyes; whereas the latter, after losing the use of those senses, frequently pass the evening of their lives in a torpid state in a chimney corner. It is from the influence of moderate and gentle stimulating employments upon the female constitution, that more women live to be old than men, and that they rarely survive their usefulness in domestic life.

Hitherto the principles I am endeavouring to establish have been applied to explain the cause of life in its more common forms. Let us next inquire, how far they will enable us to explain its continuance in certain morbid states of the body, in which there is a diminution of some, and an apparent abstraction of all the stimuli, which have been supposed to produce animal life.

I. We observe some people to be blind, or deaf and dumb, from their birth. The same defects

of sight, hearing, and speech, are sometimes brought on by diseases. Here animal life is deprived of all those numerous stimuli, which arise from light, colours, sounds, and speech. But the absence of these stimuli is supplied,

1. By increased sensibility and excitability in their remaining senses. The ears, the nose, and the fingers, afford a surface for impressions in blind people, which frequently overbalances the loss of their eye-sight. There are two blind young men, brothers, in this city, of the name of Dutton, who can tell when they approach a post in walking across a street, by a peculiar sound which the ground under their feet emits in the neighbourhood of the post. Their sense of hearing is still more exquisite to sounds of another kind. They can tell the names of a number of tame pigeons, with which they amuse themselves in a little garden, by only hearing them fly over their heads. The celebrated blind philosopher, Dr. Moyse, can distinguish a black dress on his friends, by its smell; and we read of many instances of blind persons who have been able to perceive colours by rubbing their fingers upon them. One of these persons, mentioned by Mr. Boyle, has left upon record an account of the specific quality of each colour as it affected his sense of touch. He says black imparted the most,

and blue the least, perceptible sense of asperity to his fingers.

2. By an increase of vigour in the exercises of the mental faculties. The poems of Homer, Milton, and Blacklock, and the attainments of Sander-son in mathematical knowledge, all discover how much the energy of the mind is increased by the absence of impressions upon the organs of vision.

II. We sometimes behold life in idiots, in whom there is not only an absence of the stimuli of the understanding and passions, but frequently, from the weakness of their bodies, a deficiency of the loco-motive powers. Here an inordinate appetite for food, or venereal pleasures, or a constant habit of laughing, or talking, or playing with their hands and feet, supply the place of the stimulating operations of the mind, and of general bodily exercise. Of the inordinate force of the venereal appetite in idiots we have many proofs. The Cretins are much addicted to venery ; and Dr. Michaelis tells us that the idiot whom he saw at the Passaic falls in New Jersey, who had passed six and twenty years in a cradle, acknowledged that he had venereal desires, and wished to be married, for, the doctor adds, he had a sense of religion upon his fragment of mind,

and of course did not wish to gratify that appetite in an unlawful manner.

III. How is animal life supported in persons who pass many days, and even weeks, without food, and in some instances without drinks? Long fasting is usually the effect of disease, of necessity, or of a principle of religion. When it arises from the first cause, the actions of life are kept up by the stimulus of disease.* The absence of food, when accidental, or submitted to as a means of producing moral happiness, is supplied,

1. By the stimulus of a full gall bladder. This state of the receptacle of bile has generally been found to accompany an empty stomach. The bile is sometimes absorbed, and imparts a yellow colour to the skin of persons who suffer or die of famine.

* The stimulus of a disease sometimes supplies the place of food in prolonging life. Mr. C. S——, a gentleman well known in Virginia, who was afflicted with a palsy, which had resisted the skill of several physicians, determined to destroy himself, by abstaining from food and drinks. He lived *sixty* days without eating any thing, and the greatest part of that time without tasting even a drop of water. His disease probably protracted his life thus long beyond the usual time in which death is induced by fasting. See a particular account of this case, in the first number of the second volume of Dr. Coxe's Medical Museum.

2. By increased acrimony in all the secretions and excretions of the body. The saliva becomes so acrid by long fasting, as to excoriate the gums, and the breath acquires not only a fœtor, but a pungency so active, as to draw tears from the eyes of persons who are exposed to it.

3. By increased sensibility and excitability in the sense of touch. The blind man mentioned by Mr. Boyle, who could distinguish colours by his fingers, possessed this talent only after fasting. Even a draught of any kind of liquor deprived him of it. I have taken notice, in my account of the yellow fever in Philadelphia, in the year 1793, of the effects of a diet, bordering upon fasting for six weeks, in producing a quickness and correctness in my perceptions of the state of the pulse, which I had never experienced before.

4. By an increase of activity in the understanding and passions. Gamesters often improve the exercises of their minds, when they are about to play for a large sum of money, by living for a day or two upon roasted apples and cold water. Where the passions are excited into preternatural action, the absence of the stimulus of food is scarcely felt. I shall hereafter mention the influence of the desire

of life upon its preservation, under all circumstances. It acts with peculiar force when fasting is accidental. But when it is submitted to as a religious duty, it is accompanied by sentiments and feelings which more than balance the abstraction of aliment. The body of Moses was sustained, probably without a miracle, during an abstinence of forty days and forty nights, by the pleasure he derived from conversing with his Maker "face to face, as a man speaking with his friend."*

I remarked formerly, that the veins discover no deficiency of blood in persons who die of famine. Death from this cause seems to be less the effect of the want of food, than of the combined and excessive operation of the stimuli, which supply its place in the system.

IV. We come now to a difficult inquiry, and that is, how is life supported during the total abstraction of external and internal stimuli which takes place in asphyxia, or in apparent death, from all its numerous causes ?

I took notice, in a former lecture, that ordinary life consisted in the excitement and excitability of

* Exodus xxxiii. 11. xxxiv. 28.

the different parts of the body, and that they were occasionally changed into each other. In apparent death from violent emotions of the mind, from the sudden impression of miasmata, or from drowning, there is a loss of excitement ; but the excitability of the system remains for minutes, and, in some instances, for hours afterwards unimpaired, provided the accident which produced the loss of excitement has not been attended with such exertions as are calculated to waste it. If, for example, a person should fall suddenly into the water, without bruising his body, and sink before his fears or exertions had time to dissipate his excitability ; his recovery from apparent death might be effected by the gentle action of heat or frictions upon his body, so as to convert his accumulated excitability gradually into excitement. The same condition of the system takes place when apparent death occurs from freezing, and a recovery is accomplished by the same gentle application of stimuli, provided the organization of the body be not injured, or its excitability wasted, by violent exertions previously to its freezing. This excitability is the vehicle of motion, and motion, when continued long enough, produces sensation, which is soon followed by thought ; and in these, I said formerly, consists perfect life in the human body.

For this explanation of the manner in which life is suspended and revived, in persons apparently dead from cold, I am indebted to Mr. John Hunter, who supposes, if it were possible for the body to be *suddenly* frozen, by an instantaneous abstraction of its heat, life might be continued for many years in a suspended state, and revived at pleasure, provided the body were preserved constantly in a temperature barely sufficient to prevent re-animation, and never so great as to endanger the destruction of any organic part. The resuscitation of insects, that have been in a torpid state for months, and perhaps years, in substances that have preserved their organization, should at least defend this bold proposition from being treated as chimerical. The effusions even of the imagination of such men as Mr. Hunter, are entitled to respect. They often become the germs of future discoveries.

In that state of suspended animation which occurs in acute diseases, and which has sometimes been denominated a *trance*, the system is nearly in the same excitable state that it is in apparent death from drowning and freezing. Resuscitation, in these cases, is not the effect, as in those which have been mentioned, of artificial applications made to the body for that purpose. It appears to be spontaneous ; but it is produced by impressions made

upon the ears, and by the operations of the mind in dreams. Of the actions of these stimuli upon the body in its apparently lifeless state, I have satisfied myself by many facts. I once attended a citizen of Philadelphia, who died of a pulmonary disease, in the 80th year of his age. A few days before his death, he begged that he might not be interred until one week after the usual signs of life had left his body, and gave as a reason for this request, that he had, when a young man, died to all appearance of the yellow fever, in one of the West India islands. In this situation he distinctly heard the persons who attended him, fix upon the time and place of burying him. The horror of being put under ground alive, produced such distressing emotions in his mind, as to diffuse motion throughout his body, and finally excited in him all the usual functions of life. In Dr. Creighton's essay upon mental derangement, there is a history of a case nearly of a similar nature. "A young lady (says the doctor) an attendant on the princess of —, after having been confined to her bed for a great length of time, with a violent nervous disorder, was at last, to all appearance, deprived of life. Her lips were quite pale, her face resembled the countenance of a dead person, and her body grew cold. She was removed from the room in which *she died*, was laid in a coffin, and the day for her funeral was

fixed on. The day arrived, and according to the custom of the country, funeral songs and hymns were sung before the door. Just as the people were about to nail on the lid of the coffin, a kind of perspiration was observed on the surface of her body. She recovered. The following is the account she gave of her sensations : she said, "It seemed to her as if in a dream, that she was really dead ; yet she was perfectly conscious of all that happened around her. She distinctly heard her friends speaking and lamenting her death at the side of her coffin. She felt them pull on the dead clothes, and lay her in it. This feeling produced a mental anxiety which she could not describe. She tried to cry out, but her mind was without power, and could not act on her body. She had the contradictory feeling as if she were in her own body, and not in it, at the same time. It was equally impossible for her to stretch out her arm or open her eyes, as to cry, although she continually endeavoured to do so. The internal anguish of her mind was at its utmost height when the funeral hymns began to be sung, and when the lid of the coffin was about to be nailed on. The thought that she was to be buried alive was the first which gave activity to her mind, and enabled it to operate on her corporeal frame."

Where the ears lose their capacity of being acted upon by stimuli, the mind, by its operations in dreams, becomes a source of impressions which again sets the wheels of life in motion. There is an account published by Dr. Arnold, in his observations upon insanity,* of a certain John Engelbreght, a German, who was believed to be dead, and who was evidently resuscitated by the exercises of his mind upon subjects which were of a delightful or stimulating nature. This history shall be taken from Mr. Engelbreght's words. "It was on Thursday noon (says he) about twelve o'clock, when I perceived that death was making his approaches upon me from the lower parts upwards, insomuch that my whole body became stiff. I had no feeling left in my hands and feet, neither in any other part of my whole body, nor was I at last able to speak or see, for my mouth now becoming very stiff, I was no longer able to open it, nor did I feel it any longer. My eyes also broke in my head in such a manner that I distinctly felt it. For all that, I understood what they said, when they were praying by me, and I distinctly heard them say, feel his legs, how stiff and cold they have become. This I heard distinctly, but I had no perception of their touch. I heard the watchman cry

* Vol. ii. p. 298.

11 o'clock, but at 12 o'clock my hearing left me." After relating his passage from the body to heaven with the velocity of an arrow shot from a cross bow, he proceeds, and says, that as he was twelve hours in dying, so he was twelve hours in returning to life. "As I died (says he) from beneath upwards, so I revived again the contrary way, from above to beneath, or from top to toe. Being conveyed back from the heavenly glory, I began to hear something of what they were praying for me, in the same room with me. Thus was my hearing the *first* sense I recovered. After this I began to have a perception of my eyes, so that, by little and little, my whole body became strong and sprightly, and no sooner did I get a feeling of my legs and feet, than I arose and stood firm upon them with a firmness I had never enjoyed before. The heavenly joy I had experienced, invigorated me to such a degree, that people were astonished at my rapid, and almost instantaneous recovery."

The explanation I have given of the cause of resuscitation in this man will serve to refute a belief in a supposed migration of the soul from the body, in cases of apparent death. The imagination, it is true, usually conducts the whole mind to the abodes of happy or miserable spirits, but it acts here in the same way that it does when it transports it, in com-

mon dreams, to numerous and distant parts of the world.

There is nothing supernatural in Mr. Engelbreght being invigorated by his supposed flight to heaven. Pleasant dreams always stimulate and strengthen the body, while dreams which are accompanied with distress or labour debilitate and fatigue it.

LECTURE III.

GENTLEMEN,

LET us next take a view of the state of animal life in the different inhabitants of our globe, as varied by the circumstances of civilization, diet, situation, and climate.

I. In the Indians of the northern latitudes of America there is often a defect of the stimulus of aliment, and of the understanding and passions. Their vacant countenances, and their long disgusting taciturnity, are the effects of the want of action in their brains from a deficiency of ideas ; and their tranquillity under all the common circumstances of irritation, pleasure, or grief, are the result of an absence of passion ; for they hold it to be disgraceful to show any outward signs of anger, joy, or even of domestic affection. This account of the Indian character, I know, is contrary to that which is given of it by Rousseau, and several other writers, who have attempted to prove that man may become perfect and happy without the aids of civilization and religion. This opinion is contradicted

by the experience of all ages, and is rendered ridiculous by the facts which are well ascertained in the history of the customs and habits of our American savages. In a cold climate they are the most miserable beings upon the face of the earth. The greatest part of their time is spent in sleep, or under the alternate influence of hunger and gluttony. They moreover indulge in vices which are alike contrary to moral and physical happiness. It is in consequence of these habits that they discover so early the marks of old age, and that so few of them are long-lived. The absence and diminution of many of the stimuli of life in these people is supplied in part by the violent exertions with which they hunt and carry on war, and by the extravagant manner with which they afterwards celebrate their exploits, in their savage dances and songs.

II. In the inhabitants of the torrid regions of Africa there is a deficiency of labour; for the earth produces spontaneously nearly all the sustenance they require. Their understandings and passions are moreover in a torpid state. But the absence of bodily and mental stimuli in these people is amply supplied by the constant heat of the sun, by the profuse use of spices in their diet, and by the passion for musical sounds which so universally characterises the African nations.

III. In Greenland the body is exposed during a long winter to such a degree of cold as to reduce the pulse to 40 or 50 strokes in a minute. But the effects of this cold in lessening the quantity of life are obviated in part by the heat of close stove rooms, by warm clothing, and by the peculiar nature of the aliment of the Greenlanders, which consists chiefly of animal food, of dried fish, and of whale oil. They prefer the last of those articles in so rancid a state, that it imparts a foetor to their perspiration, which, Mr. Crantz says, renders even their churches offensive to strangers. I need hardly add, that a diet possessed of such diffusible qualities cannot fail of being highly stimulating. It is remarkable that the food of all the northern nations of Europe is composed of stimulating animal or vegetable matters, and that the use of spirituous liquors is universal among them.

IV. Let us next turn our eyes to the miserable inhabitants of those eastern countries which compose the Turkish empire. Here we behold life in its most feeble state, not only from the absence of physical, but of other stimuli which operate upon the inhabitants of other parts of the world. Among the poor people of Turkey there is a general deficiency of aliment. Mr. Volney in his Travels tells us, " That the diet of the Bedouins seldom exceeds

six ounces a day, and that it consists of six or seven dates soaked in butter-milk, and afterwards mixed with a little sweet milk, or curds." There is likewise a general deficiency among them of stimulus from the operations of the mental faculties; for such is the despotism of the government in Turkey, that it weakens not only the understanding, but it annihilates all that immense source of stimuli which arises from the exercise of the domestic and public affections. A Turk lives wholly to himself. In point of time he occupies only the moment in which he exists; for his futurity, as to life and property, belongs altogether to his master. Fear is the reigning principle of his actions, and hope and joy seldom add a single pulsation to his heart. Tyranny even imposes a restraint upon the stimulus which arises from conversation, for "They speak (says Mr. Volney) with a slow feeble voice, as if the lungs wanted strength to propel air enough through the glottis to form distinct articulate sounds." The same traveller adds, that "They are slow in all their motions, that their bodies are small, that they have small evacuations, and that their blood is so destitute of serocity, that nothing but the greatest heat can preserve its fluidity." The deficiency of aliment, and the absence of mental stimuli in these people is supplied,

1. By the heat of their climate.
2. By their passion for musical sounds and fine clothes. And
3. By their general use of coffee, garlic,* and opium.

The more debilitated the body is, the more forcibly these stimuli act upon it. Hence, according to Mr. Volney, the Bedouins, whose slender diet has been mentioned, enjoy good health; for this consists not in strength, but in an exact proportion being kept up between the excitability of the body, and the number and force of the stimuli which act upon it.

V. Many of the observations which have been made upon the inhabitants of Africa, and of the Turkish dominions, apply to the inhabitants of China and the East Indies. They want, in many instances, the stimulus of animal food. Their minds are, moreover, in a state too languid to act with much force upon their bodies. The absence and deficiency of these stimuli are supplied by,

* Niebuhr's Travels.

1. The heat of the climate in the southern parts of those countries.

2. By a vegetable diet abounding in nourishment, particularly rice and beans.

3. By the use of tea in China, and by a stimulating coffee made of the dried and toasted seeds of the *datura stramonium*, in the neighbourhood of the Indian coast. Some of these nations likewise chew stimulating substances, as too many of our citizens do tobacco.

Among the poor and depressed subjects of the governments of the middle and southern parts of Europe, the deficiency of the stimulus of wholesome food, of clothing, of fuel, and of liberty, is supplied, in some countries, by the invigorating influence of the christian religion upon animal life, and in others by the general use of tea, coffee, garlic, onions, opium, tobacco, malt liquors, and ardent spirits. The use of each of these stimuli seems to be regulated by the circumstances of climate. In cold countries, where the earth yields its increase with reluctance, and where vegetable aliment is scarce, the want of the stimulus of distention which that species of food is principally calculated to produce is sought for in that of ardent

spirits. To the southward of 40° , a substitute for the distention from mild vegetable food is sought for in onions, garlic, and tobacco. But further, a uniform climate calls for more of these artificial stimuli than a climate that is exposed to the alternate action of heat and cold, winds and calms, and of wet and dry weather. Savages and ignorant people likewise require more of them than persons of civilized manners, and cultivated understandings. It would seem from these facts that man cannot exist without *sensation* of some kind, and that when it is not derived from natural means, it will always be sought for in such as are artificial.

In no part of the human species, is animal life in a more perfect state than in the inhabitants of Great Britain,* and the United States of America. With all the natural stimuli that have been mentioned, they are constantly under the invigorating influence of liberty. There is an indissoluble union between moral, political, and physical happiness; and if it be true, that elective and representative governments are most favourable to individual, as well as national prosperity, it follows of course, that they are most favourable to animal life. But this opinion does not rest upon an induc-

* Haller's *Elementa Physiologiæ*, vol. viii. p. 2. p. 107.

tion derived from the relation, which truths upon all subjects bear to each other. Many facts prove animal life to exist in a larger quantity and for a longer time, in the enlightened and happy state of Connecticut, in which republican liberty has existed above one hundred and fifty years, than in any other country upon the surface of the globe.

It remains now to mention certain mental stimuli which act nearly alike in the production of animal life, upon the individuals of all the nations in the world. They are,

1. The desire of life. This principle, so deeply and universally implanted in human nature, acts very powerfully in supporting our existence. It has been observed to prolong life. Sickly travellers by sea and land, often live under circumstances of the greatest weakness, till they reach their native country, and then expire in the bosom of their friends. This desire of life often turns the scale in favour of a recovery in acute diseases. Its influence will appear, from the difference in the periods in which death was induced in two persons, who were actuated by opposite passions with respect to life. Atticus, we are told, died of voluntary abstinence from food in five days. In sir William Hamilton's account of the earthquake at Cala-

bria, we read of a girl who lived eleven days without food before she expired. In the former case, life was shortened by an aversion from it; in the latter, it was protracted by the desire of it. The late Mr. Brissot, in his visit to this city, informed me, that the application of animal magnetism (in which he was a believer) had in no instance cured a disease in a West India slave. Perhaps it was rendered inert, by its not being accompanied by a strong desire of life; for this principle exists in a more feeble state in slaves than in freemen. It is possible likewise the wills and imaginations of these degraded people may have become so paralytic, by slavery, as to be incapable of being excited by the impression of this fanciful remedy.

2. The love of money sets the whole animal machine in motion. Hearts, which are insensible to the stimuli of religion, patriotism, love, and even of the domestic affections, are excited into action by this passion. The city of Philadelphia, between the 10th and 15th of August, 1791, will long be remembered by contemplative men, for having furnished the most extraordinary proofs of the stimulus of the love of money upon the human body. A new scene of speculation was produced at that time by the scrip of the bank of the United States.

It excited febrile diseases in three persons who became my patients. In one of them, the acquisition of twelve thousand dollars in a few minutes, by a lucky sale, brought on madness, which terminated in death in a few days.* The whole city felt the impulse of this paroxysm of avarice. The slow and ordinary means of earning money were deserted, and men of every profession and trade were seen in all our streets hastening to the coffee-house, where the agitation of countenance, and the desultory manners, of all the persons who were interested in this species of gaming, exhibited a truer picture of a bedlam, than of a place appropriated to the transaction of mercantile business. But further, the love of money discovers its stimulus upon the body in a peculiar manner in the games of cards and dice. I have heard of a gentleman in Virginia who passed two whole days and nights in succession at a card table ; and it is related in the life of a noted gamester in Ireland, that when he was so ill as to be unable to rise from his chair, he would suddenly revive when brought to the hazard table, by hearing the rattling of the dice.

* Dr. Mead relates, upon the authority of Dr. Hales, that more of the successful speculators in the South-Sea scheme of 1720 became insane, than of those who had been ruined by it.

3. Public amusements of all kinds, such as a horse race, a cockpit, a chase, the theatre, the circus, masquerades, public dinners, and tea parties, all exert an artificial stimulus upon the system, and thus supply the defect of the rational exercises of the mind.

4. The love of dress is not confined in its stimulating operation to persons in health. It acts perceptibly in some cases upon invalids. I have heard of a gentleman in South Carolina, who always relieved himself of a fit of low spirits by changing his dress; and I believe there are few people, who do not feel themselves enlivened by putting on a new suit of clothes.

5. Novelty is an immense source of agreeable stimuli. Companions, studies, pleasures, modes of business, prospects, and situations, with respect to town and country, or to different countries, that are *new*, all exert an invigorating influence upon health and life.

6. The love of fame acts in various ways; but its stimulus is most sensible and durable in military life. It counteracts in many instances the debilitating effects of hunger, cold, and labour. It has sometimes done more, by removing the weakness which

is connected with many diseases. In several instances, it has assisted the hardships of a camp life in curing pulmonary consumption.

7. The love of country is a deep seated principle of action in the human breast. Its stimulus is sometimes so excessive, as to induce disease in persons who recently migrate, and settle in foreign countries. It appears in various forms ; but exists most frequently in the solicitude, labours, attachments, and hatred of party spirit. All these act forcibly in supporting animal life. It is because newspapers are supposed to contain the measure of the happiness or misery of our country, that they are so interesting to all classes of people. Those vehicles of intelligence, and of public pleasure or pain, are frequently desired with the impatience of a meal, and they often produce the same stimulating effects upon the body.*

8. The different religions of the world, by the activity they excite in the mind, have a sensible influence upon human life. Atheism is the worst of sedatives to the understanding and passions. It is the abstraction of thought from the most sublime,

* They have been very happily called by Mr. Green in his poem entitled Spleen, "the manna of the day."

and of love from the most perfect, of all possible objects: Man is as naturally a religious, as he is a social and domestic, animal; and the same violence is done to his mental faculties, by robbing him of a belief in a God, that is done by dooming him to live in a cell, deprived of the objects and pleasures of social and domestic life. The necessary and immutable connection between the texture of the human mind, and the worship of an object of some kind, has lately been demonstrated by the atheists of Europe, who, after rejecting the true God, have instituted the worship of nature, of fortune, and of human reason; and, in some instances, with ceremonies of the most expensive and splendid kind. Religions are friendly to animal life, in proportion as they elevate the understanding, and act upon the passions of hope and love. It will readily occur to you, that christianity, when believed and obeyed, according to its original consistency with itself, and with the divine attributes, is more calculated to produce those effects than any other religion in the world. Such is the salutary operation of its doctrines and precepts upon health and life, that if its divine authority rested upon no other argument, this alone would be sufficient to recommend it to our belief. How long mankind may continue to prefer substituted pursuits and pleasures to this invigorating stimulus is uncer-

tain; but the time, we are assured, will come, when the understanding shall be elevated from its present inferior objects, and the luxated passions be reduced to their original order. This change in the mind of man, I believe, will be effected only by the influence of the christian religion, after all the efforts of human reason to produce it, by means of civilization, philosophy, liberty, and government, have been exhausted to no purpose.

Thus far, gentlemen, we have considered animal life as it respects the human species; but the principles I am endeavouring to establish require that we should take a view of it in animals of every species, in all of which we shall find it depends upon the same causes as in the human body.

And here I shall begin by remarking, that if we should discover the stimuli which support life in certain animals to be fewer in number, or weaker in force, than those which support it in our species, we must resolve it into that attribute of the Deity, which seems to have delighted in variety in all his works.

The following observations apply more or less to all the animals upon our globe.

1. They all possess either hearts, lungs, brains, nerves, or muscular fibres. It is as yet a controversy among naturalists, whether animal life can exist without a brain; but no one has denied muscular fibres, and of course contractility, or excitability, to belong to animal life, in all its shapes.

2. They all require more or less air for their existence. Even the snail inhales it for seven months under ground through a pellicle, which it weaves out of slime, as a covering for its body. If this pellicle at any time become too thick to admit the air, the snail opens a passage in it for that purpose. Now air we know acts powerfully in supporting animal life.

3. Many of them possess heat equal to that of the human body. Birds possess several degrees beyond it. Now heat, it was said formerly, acts with great force in the production of animal life.

4. They all feed upon substances more or less stimulating to their bodies. Even water itself, chemistry has taught us, affords an aliment, not only stimulating, but nourishing to many animals.

5. Many of them possess senses more acute and excitable, than the same organs in the human

species. These expose surfaces for the action of external impressions, that supply the absence or deficiency of mental faculties.

6. Such of them as are devoid of sensibility possess an uncommon portion of contractility, or simple excitability. This is most evident in the polypus. When cut to pieces, it appears to feel little or no pain.

7. They all possess loco-motive powers in a greater or less degree, and of course are acted upon by the stimulus of muscular motion.

8. Most of them appear to feel a stimulus, from the gratification of their appetites for food, and for venereal pleasures, far more powerful than that which is felt by our species from the same causes. I shall hereafter mention some facts from Spallanzani upon the subject of generation, that will prove the stimulus, from venery, to be strongest in those animals, in which other stimuli act with the least force. Thus the male frog, during its long connection with its female, suffers its limbs to be amputated, without discovering the least mark of pain, and without relaxing its hold of the object of its embraces.

9. In many animals we behold evident marks of understanding and passion. The elephant, the fox, and the ant, exhibit strong proofs of thought; and where is the school boy that cannot bear testimony to the anger of the bee and the wasp?

10. But what shall we say of those animals, which pass long winters in a state in which there is an apparent absence of the stimuli of heat, exercise, and the motion of the blood. Life in these animals is probably supported,

1. By such an accumulation of excitability, as to yield to impressions, which to us are imperceptible.

2. By the stimulus of aliment in a state of digestion in the stomach, or by the stimulus of aliment restrained from digestion by means of cold; for Mr. John Hunter has proved, by an experiment on a frog, that cold below a certain degree, checks that animal process.

3. By the constant action of air upon their bodies.

It is possible life may exist in these animals, during their hybernation, in the total absence of im-

pression and motion of every kind. This may be the case, where the torpor from cold has been *suddenly* brought upon their bodies. Excitability here is in an accumulated, but quiescent, state.

11. It remains only under this head to inquire, in what manner is life supported in those animals which live in a cold element, and whose blood is sometimes but a little above the freezing point? It will be a sufficient answer to this question to remark, that heat and cold are relative terms, and that different animals, according to their organization, require very different degrees of heat for their existence. Thirty-two degrees of it are probably as stimulating to some of these cold blooded animals, (as they are called,) as 70° or 80° are to the human body.

It might afford additional support to the doctrine of animal life which I have delivered, to point out the manner in which life and growth are produced in vegetables of all kinds. But this subject belongs to the professor of botany and natural history,* who is amply qualified to do it justice. I shall only remark, that vegetable life is as much the offspring of stimuli as animal, and that skill in agri-

* Dr. Barton.

culture consists chiefly in the proper application of them. The seed of a plant, like an animal body, has no principle of life within itself. If preserved for many years in a drawer, or in earth, below the stimulating influence of heat, air, and water, it discovers no sign of vegetation. It grows, like an animal, only in consequence of stimuli acting upon its *capacity* of life.

From a review of what has been said of animal life, in all its numerous forms and modifications, we see that it is as much an effect of impressions upon a peculiar species of matter, as sound is of the stroke of a hammer upon a bell, or music of the motion of the bow upon the strings of a violin. I exclude therefore the intelligent principle of Whytt, the medical mind of Stahl, the healing powers of Cullen, and the vital principal of John Hunter, as much from the body, as I do an intelligent principle from air, fire, and water.

Upon the opinions of these different authors, I beg leave to add further, that they are all modifications of two errors held by Pythagoras and Epicurus. The former believed and taught what is called the transmigration of souls, that is, that the principle of life, rational and animal, was a kind of

elementary body; that it never died; and that it passed from animals that perished, into other animal matter, and thereby imparted to it a soul, or what is called life. This opinion accords with the vital principle of Mr. Hunter and Dr. Girtanner, while the *anima medica* of Stahl accords with the doctrine taught by Epicurus, of the globe being animated by a principle called *anima mundi*. Both opinions substitute an intelligent and self-moving principle to the agency of a Supreme Being, in every part of his works. There is a third error connected with this subject, which it may not be improper to mention upon this occasion, and that is, that man consists of spirit, soul, and body....that his spirit resides in his brain, and is concerned only in intellectual and spiritual exercises....that his soul is diffused through every part of his body, and constitutes what is called his "soulish," or animal, life. This pagan opinion seems to have tinctured some of the writings of St. Paul, who, though inspired by the Spirit of truth upon theological subjects, was left to follow the opinions of the world in matters of human learning. The doctrine I have delivered, obliges us to consider man as consisting and of two parts only; these are, soul, or mind, and body. This view of the nature of man is simple, and accords alike with reason and revelation.

The speaking figures, which are conducted through our country as spectacles to amuse the vulgar, afford a striking illustration of the error of animal life depending upon a self-moving principle in the body. The voice is supposed to come from *within* the figure ; whereas, it is certain it is conveyed there by the reflection of words pronounced by a person external to it.

I have often been struck with the similarity of the controversies upon the origin of moral obligation, of power, and of animal life, and with the similarity of their issue in a simple elementary truth, obvious to the most humble capacities. They were all believed to depend upon causes within themselves ; but they are now rescued from an internal and placed upon an external basis. The origin of moral obligation, which was formerly ascribed to utility, to sympathy, and to the fitness of things, is now derived wholly from the will of God. The origin of power, which was derived for ages from divine or hereditary right, now rests exclusively upon the will of the people, while the origin of animal life, which has been, time immemorial, derived from a self-moving power, under the different names that have been mentioned, now reposes, probably for ever, upon

external and internal impressions. By means of this doctrine, revelation and reason embrace each other, and Moses and the prophets shake hands with Dr. Brown, and all those physicians, who maintain the great and sublime truth which he has promulgated. Think of it, gentlemen, in your closets, and in your beds, and talk of it in your walks, and by your fire-sides. It is the active and wide-spreading seminal principle of all truth in medicine.

It is no uncommon thing for the simplicity of causes to be lost in the magnitude of their effects. By contemplating the wonderful functions of life, we have strangely overlooked the numerous and obscure circumstances which produce it. Thus the humble but true origin of power in the people, is often forgotten in the splendour and pride of governments. It is not necessary to be acquainted with the precise nature of that form of matter, which is capable of producing life from impressions made upon it. It is sufficient for our purpose to know the fact. It is immaterial, moreover, whether this matter derives its power of being acted upon wholly from the brain, or whether it be in part inherent in animal fibres. The inferences are the same in favour of life being the effect of stimuli,

and of its being as truly mechanical, as the movements of a clock from the pressure of its weights, or the passage of a ship in the water from the impulse of winds and tide.

The infinity of effects, from similar causes, has often been taken notice of in the works of the Creator. It would seem as if they had all been made after one pattern. The late discovery of the cause of combustion has thrown great light upon our subject. Wood and coal are no longer believed to contain a principle of fire. The heat and flame they emit are derived from an agent altogether external to them. They are produced by a matter, which is absorbed from the air by means of its decomposition. This matter acts upon the predisposition of the fuel to receive it, in the same way that stimuli act upon the human body. The two agents differ only in their effects. The former produces the destruction of the bodies upon which it acts, while the latter excites the more gentle and durable motions of life. Common language in expressing these effects is correct, as far as it relates to their cause. We speak of a coal of fire being *alive*, and of the *flame* of life.

The causes of life which I have delivered will receive considerable support, by contrasting them

with the causes of death. This catastrophe of the body consists in such a change, induced on it by disease or old age, as to prevent its exhibiting the phenomena of life. It is brought on,

1. By the abstraction of all the stimuli which support life. Death from this cause is produced by the same mechanical means, that the emission of sound from a violin is prevented by the abstraction of the bow from its strings.

2. By the excessive force of stimuli of all kinds. No more occurs here, than happens from too much pressure upon the strings of a violin, preventing its emitting musical tones.

3. By too much relaxation, or too weak a texture of the matter which composes the human body. No more occurs here, than is observed in the extinction of sound by the total relaxation or slender combination of the strings of a violin.

4. By an error in the place of certain fluid or solid parts of the body. No more occurs here, than would happen from fixing the strings of a violin upon its body, instead of elevating them upon its bridge.

5. By the action of poisonous exhalations, or of certain fluids vitiated in the body, upon parts which emit most forcibly the motions of life. No more happens here, than occurs from enveloping the strings of a violin in a piece of wax.

6. By the solution of continuity, by means of wounds in solid parts of the body. No more occurs in death from this cause, than takes place when the emission of sound from a violin is prevented by a rupture of its strings.

7. Death is produced by a preternatural rigidity, and in some instances by an ossification of the solid parts of the body in old age, in consequence of which they are incapable of receiving and emitting the motions of life. No more occurs here, than would happen if a stick or pipe-stem were placed, in the room of catgut, upon the bridges of the violin. But death may take place in old age, without a change in the texture of animal matter, from the stimuli of life losing their effect by repetition, just as opium, from the same cause, ceases to produce its usual effects upon the body.

Should it be asked, what is that peculiar organization of matter, which enables it to emit life, when acted upon by stimuli, I answer, I do not know.

It is true, the votaries of chemistry have lately attempted to imitate it; but no arrangements of matter by their hands have ever produced a single living fibre, nor have any of their compounds produced a substance endowed with the properties of dead animal matter. Lavoissier laboured in vain to produce that simple animal substance we call bile. That the human body is composed of certain matters which belong to the objects of chemistry, there can be no doubt; but their proportions, and manner of aggregation, are unknown to us; nor are the products, when obtained by fire, the same in form, number, or proportion, which existed in the body in its living state. But admitting this medico-chemical theory of animal life to be demonstrated, it does not in the least degree militate against the doctrine which I have taught. Let us suppose a chemist to have discovered all the matters which compose an animal body, and to have arranged them in their exact order and proportions, they cannot in this situation assume the properties of life, without the impression of some agent upon them. A stimulus of some kind must give them activity. Even the matter of phosphorus torpid, when confined in a phial. It requires the stimulus of air to impart to it its blazing life. It is remarkable, that some of the ancient philosophers had more correct ideas of the origin of animal life

than some of our modern chemists. This is elegantly illustrated in the fable of Prometheus. He was unable, by any chemical combination, to animate his image of clay, until he stole fire, or an external stimulus from heaven, for that purpose. As well might we suppose thinking to be a chemical process, as motion and sensation. They are all alike the effects of impression. We think by force, as well as live by force. If any man doubt the truth of this assertion, let him suspend, for a moment, the operations of his mind, or, in other words, let him cease to think. As well might he attempt to stop the pulsation of his heart, by the action of his will, or to arrest the planets in their course, by holding up his finger. Here then let us limit our inquiries, and remain satisfied with facts which are obvious, and capable of application to all the useful purposes of medicine.

The great Creator has kindly established a witness of his unsearchable wisdom in every part of his works, in order to prevent our forgetting him, in the successful exercises of our reason. Mahomet once said, “that he should believe himself to be a God, if he could bring down rain from the clouds, or give life to an animal.” It belongs exclusively to the true God to endow matter with those singular properties, which enable it, under

certain circumstances, to exhibit the appearances of life.

I cannot conclude this subject, without taking notice of its extensive application to medicine, metaphysics, theology, and morals.

The doctrine of animal life which has been taught exhibits, in the

First place, a new view of the nervous system, by discovering its origin in the extremities of the nerves on which impressions are made, and its termination in the brain. This idea is extended in an ingenious manner by Mr. Valli, in his treatise upon animal electricity.

2. It discovers to us the true means of promoting health and longevity, by proportioning the number and force of stimuli to the age, climate, situation, habits, and temperament of the human body.

3. It leads us to a knowledge of the causes of all diseases. These consist in excessive or preternatural excitement in certain parts, of the human body, accompanied *generally* with irregular motions, and induced by natural or artificial stimuli. The latter have been called, very properly, by Mr.

Hunter, *irritants*. The occasional absence of motion in acute diseases is the effect only of the excess of impetus in their remote causes.

4. It discovers to us that the cure of all diseases depends simply upon the abstraction of stimuli from the whole, or from a part, of the body, when the motions excited by them are in excess ; and in the increase of their number and force, when motions are of a moderate nature. For the former purpose, we employ a class of medicines known by the name of sedatives. For the latter, we make use of stimulants. Under these two extensive heads are included all the numerous articles of the *materia medica*.

5. It enables us to reject the doctrine of innate ideas, and to ascribe all our knowledge of sensible objects to impressions acting upon an *innate* capacity to receive ideas. Were it possible for a child to grow up to manhood without the use of any of its senses, it would not possess a single idea of a material object ; and as all human knowledge is compounded of simple ideas, this person would be as destitute of knowledge of every kind, as the grossest portion of vegetable or fossil matter.

6. The account which has been given of animal life furnishes a striking illustration of the origin of human actions, by the impression of motives upon the will. As well might we admit an inherent principle of life in animal matter, as a self-determining power in this faculty of the mind. Motives are necessary, not only to constitute its *freedom*, but its *essence* ; for, without them, there could be no more a will, than there could be vision without light, or hearing without sound. It is true, they are often so obscure as not to be perceived, and they sometimes become insensible from habit ; but the same things have been remarked in the operation of stimuli, and yet we do not upon this account deny their agency in producing animal life. In thus deciding in favour of the necessity of motives to produce actions, I cannot help bearing a testimony against the gloomy misapplication of this doctrine by some modern writers. When properly understood, it is calculated to produce the most comfortable views of the divine government, and the most beneficial effects upon morals and human happiness.

7. There are errors of an impious nature, which sometimes obtain a currency, from being disguised by innocent names. The doctrine of animal life that has been delivered is directly opposed to an

error of this kind, which has had the most baneful influence upon morals and religion. To suppose a principle to reside necessarily and constantly in the human body, which acted independently of external circumstances, is to ascribe to it an attribute, which I shall not connect, even in language, with the creature man. Self-existence belongs only to God.

The best criterion of the truth of a philosophical opinion is, its tendency to produce exalted ideas of the Divine Being, and humble views of ourselves. The doctrine of animal life which has been delivered is calculated to produce these effects in an eminent degree ; for

8. It does homage to the Supreme Being, as the governor of the universe, and establishes the certainty of his universal and particular providence. Admit a principle of life in the human body, and we open a door for the restoration of the old Epicurean or atheistical philosophy which has been mentioned. The doctrine I have taught cuts the sinews of that error ; for by rendering the *continuance* of animal life, no less than its commencement, the effect of the constant operation of divine power and goodness, it leads us to believe that the whole creation is supported in the same manner.

It leads us further to distinguish between the works of the Creator of the universe, and the works of a common architect. It has been supposed by some men, that the author of our world formed all its wonderful machinery as a man makes a clock, and, having wound it up, threw it out of his hands, and afterwards retired to rest, or employed himself in other acts of creating power ;, or if this were not the case, that he committed the care of his works to certain deputies, called nature in the inanimate, and vital principle in the animated parts of the globe. This idea is contrary to the whole tenor of revelation. The Being that created our world never takes his hand, nor his eye, for a single moment, from any part of it. He constantly

“ Warms in the sun, refreshes in each breeze,
“ Glows in the stars, blossoms in the trees,
“ Lives through all life, extends through all extent,
“ Spreads undivided, operates unspent.”

His providence is one continued act of creating power. The sun rises (to use the words of a late elegant writer*) only because he says every morning, “ let there be light.” The moon and the stars supply the absence of the sun, only because he says every evening, “ let there be lights in the firmament

* Mr. Fawcett.

of heaven, to divide the day from the night.” The seasons of spring and autumn return, only because he says, “let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit according to its kind;” and even man exists, only because he breathes into his nostrils the breath, or air, of life, not only at his birth, but every moment of his existence.

9. The view that has been given of the dependent state of man for the blessing of life leads us to contemplate, with very opposite and inexpressible feelings, the sublime idea which is given of the Deity in the scriptures, as possessing life “within himself.” This divine prerogative has never been imparted but to one Being, and that is the Son of God. This appears from the following declaration. “For as the Father hath life in himself, so hath he given to the Son to have life *within himself*.”* To this plenitude of independent life we are to ascribe his being called, the “life of the world,” “the prince of life,” and “life” itself, in the New Testament. These divine epithets, which are very properly founded upon the manner of our Saviour’s existence, exalt him infinitely above sim-

* John v. verse 26,

ple humanity, and establish his divine nature upon the basis of reason, as well as revelation.

10. We have heard that some of the stimuli, which produce animal life, are derived from the moral and physical evils of our world. From beholding these instruments of death thus converted by divine skill into the means of life, we are led to believe goodness to be the supreme attribute of the Deity, and that it will appear finally to predominate in all his works.

11. The doctrine which has been delivered is calculated to humble the pride of man, by teaching him his constant dependence upon his Maker for his existence, and that he has no pre-eminence, in his tenure of it, over the meanest insect that flutters in the air, or the humblest plant that grows upon the earth. What an inspired writer says of the innumerable animals which inhabit the ocean, may with equal propriety be said of the whole human race. "Thou sendest forth thy spirit, and they are created. Thou takest away their breath,—they die, and return to their dust." Let us not complain of this tenure of our lives. By taking their capital out of our hands, and dealing it out to us according to our necessities, our benevolent Creator prevents our squandering it away without

judgment or prudence, and thus becoming bankrupts in life as soon as we began to exist.

12. Melancholy indeed would have been the issue of all our inquiries, did we take a final leave of the human body in its state of decomposition in the grave. Revelation furnishes us with an elevating and comfortable assurance that this will not be the case. The precise manner of its re-organization, and the new means of its future existence, are unknown to us. It is sufficient to believe the event will take place, and that, after it, the soul and body of man will be exalted, in one respect, to an equality with their Creator. They will be immortal.

Here, gentlemen, we close the history of animal life. I feel as if I had waded across a rapid and dangerous stream. Whether I have gained the opposite shore with my head clean, or covered with mud and weeds, I leave wholly to your determination.

AN INQUIRY
INTO THE
NATURAL HISTORY OF MEDICINE
AMONG THE
INDIANS OF NORTH AMERICA:
AND
A COMPARATIVE VIEW
OF
THEIR DISEASES AND REMEDIES WITH THOSE
OF CIVILIZED NATIONS.

READ BEFORE THE AMERICAN PHILOSOPHICAL SOCIETY, HELD AT
PHILADELPHIA, ON THE FOURTH OF FEBRUARY, 1774.

AN INQUIRY, &c.

GENTLEMEN,*

I RISE with peculiar diffidence to address you upon this occasion, when I reflect upon the entertainment you proposed to yourselves from the eloquence of that learned member, Mr. CHARLES THOMPSON, whom your suffrages appointed to this honour, after the delivery of the last anniversary oration. Unhappily for the interests of science, his want of health has not permitted him to comply with your appointment. I beg, therefore, that you would forget, for a while, the abilities necessary to execute this task with propriety, and listen with candour to the efforts of a member, whose attachment to the society was the only qua-

* This INQUIRY was the subject of an Anniversary Oration. The style of an oration is therefore preserved in many parts of it.

lification that entitled him to the honour of your choice.

The subject I have chosen for this evening's entertainment is, "An inquiry into the natural history of medicine among the Indians in North America, and a comparative view of their diseases and remedies with those of civilized nations." You will readily anticipate the difficulty of doing justice to this subject. How shall we distinguish between the original diseases of the Indians and those contracted from their intercourse with the Europeans? By what arts shall we persuade them to discover their remedies? And, lastly, how shall we come at the knowledge of facts, in that cloud of errors in which the credulity of the Europeans, and the superstition of the Indians, have involved both their diseases and remedies? These difficulties serve to increase the importance of our subject. If I should not be able to solve them, perhaps I may lead the way to more successful endeavours for that purpose.

I shall first limit the tribes of Indians, who are to be the objects of this inquiry, to those who inhabit that part of North-America which extends from the 30th to the 60th degree of latitude. When we exclude the Esquimaux, who inhabit

the shores of Hudson's bay, we shall find a general resemblance in the colour, manners, and state of society, among all the tribes of Indians, who inhabit the extensive tract of country above-mentioned.

Civilians have divided nations into savage, barbarous, and civilized. The savage live by fishing and hunting; the barbarous, by pasturage or cattle; and the civilized, by agriculture. Each of these is connected together in such a manner, that the whole appear to form different parts of a circle. Even the manners of the most civilized nations partake of those of the savage. It would seem as if liberty and indolence were the highest pursuits of man; and these are enjoyed in their greatest perfection by savages, or in the practice of customs which resemble those of savages.

The Indians of North-America partake chiefly of the manner of savages. In the earliest accounts we have of them, we find them cultivating a spot of ground. The maize is an original grain among them. The different dishes of it which are in use among the white people still retain Indian names.

It will be unnecessary to show that the Indians live in a state of society adapted to all the exigencies of their mode of life. Those who look for

the simplicity and perfection of the state of nature must seek it in systems, as absurd in philosophy, as they are delightful in poetry.

Before we attempt to ascertain the number or history of the diseases of the Indians, it will be necessary to inquire into those customs among them, which we know influence diseases. For this purpose I shall,

First, Mention a few facts which relate to the birth and treatment of their children.

Secondly, I shall speak of their diet.

Thirdly, Of the customs which are peculiar to the sexes, and,

Fourthly, Of those customs which are common to them both.*

* Many of the facts contained in the Natural History of Medicine among the Indians, in this Inquiry, are taken from La Hontan and Charlevoix's histories of Canada; but the most material of them are taken from persons, who had lived or travelled among the Indians. The author acknowledges himself indebted in a particular manner to Mr. Edward Hand, surgeon in the 18th regiment, afterwards brigadier-general in the army of the United States, who,

I. Of the birth and treatment of their children.

Much of the future health of the body depends upon its original stamina. A child born of healthy parents always brings into the world a system formed by nature to resist the causes of diseases. The treatment of children among the Indians tends to secure this hereditary firmness of constitution. Their first food is their mother's milk. To harden them against the action of heat and cold (the natural enemies of health and life among the Indians) they are plunged every day into cold water. In order to facilitate their being moved from place to place, and at the same time to preserve their shape, they are tied to a board, where they lie on their backs for six, ten, or eighteen months. A child generally sucks its mother till it is two years old, and sometimes longer. It is easy to conceive how much vigour their bodies must acquire from this simple, but wholesome nourishment. The appetite we sometimes observe in children for flesh is altogether artificial. The peculiar irritability of the system in infancy forbids stimulating aliment of all kinds. Nature never calls for animal food, till she has provided the child during several years' residence at Fort Pitt, directed his inquiries into their customs, diseases, and remedies, with a success that does equal honour to his ingenuity and diligence.

with those teeth which are necessary to divide it. I shall not undertake to determine how far the wholesome quality of the mother's milk is increased, by her refusing the embraces of her husband during the time of giving suck.

II. The diet of the Indians is of a mixed nature, being partly animal, and partly vegetable. Their animals are wild, and therefore easy of digestion. As the Indians are naturally more disposed to the indolent employment of fishing than hunting, in summer, so we find them living more upon fish than land animals, in that season of the year. Their vegetables consist of roots and fruits, mild in themselves, or capable of being made so by the action of fire. Although the interior parts of our continent abound with salt springs, yet I cannot find that the Indians used salt in their diet, till they were instructed to do so by the Europeans. The small quantity of fixed alkali contained in the ashes, on which they roasted their meat, could not add much to its stimulating quality. They preserve their meat from putrefaction, by cutting it into small pieces, and exposing it in summer to the sun, and in winter to the frost. In the one case its moisture is dissipated, and in the other so frozen, that it cannot undergo the putrefactive process. In dressing their meat, they are careful to preserve

its juices. They generally prefer it in the form of soups. Hence we find, that among them the use of the spoon preceded that of the knife and fork. They take the same pains to preserve the juice of their meat when they roast it, by turning it often. The efficacy of this animal juice, in dissolving meat in the stomach, has not been equalled by any of those sauces or liquors, which modern luxury has mixed with it for that purpose.

The Indians have no set time for eating, but obey the gentle appetites of nature as often as they are called by them. After whole days spent in the chase, or in war, they often commit those excesses in eating, to which long abstinence cannot fail of prompting them. It is common to see them spend three or four hours in satisfying their hunger. This is occasioned, not more by the quantity they eat, than by the pains they take in masticating it. They carefully avoid drinking water in their marches, from an opinion that it lessens their ability to bear fatigue.

III. We now come to speak of those customs which are peculiar to the sexes. And, first, of those which belong to the WOMEN. They are doomed by their husbands to such domestic labour as gives a firmness to their bodies, bordering upon

the masculine. Their menses seldom begin to flow before they are eighteen or twenty years of age, and generally cease before they are forty. They have them in small quantities, but at regular intervals. They seldom marry till they are about twenty. The constitution has now acquired a vigour, which enables it the better to support the convulsions of child-bearing. This custom likewise guards against a premature old age. Doctor Bancroft ascribes the haggard looks, the loose hanging breasts, and the prominent bellies of the Indian women at Guiana, entirely to their bearing children too early.* Where marriages are unfruitful (which is seldom the case) a separation is obtained by means of an easy divorce; so that they are unacquainted with the disquietudes which sometimes arise from barrenness. During pregnancy, the women are exempted from the more laborious parts of their duty: hence miscarriages rarely happen among them. Nature is their only midwife. Their labours are short, and accompanied with little pain. Each woman is delivered in a private cabin, without so much as one of her own sex to attend her. After washing herself in cold water, she returns in a few days to her usual employments; so that she knows nothing of

* Natural History of Guiana.

those accidents, which proceed from the carelessness or ill management of midwives; or those weaknesses, which arise from a month's confinement in a warm room. It is remarkable that there is hardly a period in the interval between the eruption and the ceasing of the menses, in which they are not pregnant, or giving suck. This is the most natural state of the constitution during that interval; and hence we often find it connected with the best state of health in the women of civilized nations.

The customs peculiar to the Indian MEN consist chiefly in those employments which are necessary to preserve animal life, and to defend their nation. These employments are hunting and war, each of which is conducted in a manner that tends to call forth every fibre into exercise, and to ensure them the possession of the utmost possible health. In times of plenty and peace, we see them sometimes rising from their beloved indolence, and shaking off its influence by the salutary exercises of dancing and swimming. The Indian men seldom marry before they are thirty years of age: they no doubt derive considerable vigour from this custom; for while they are secured by it from the enervating effects of the premature dalliance of love, they may insure more certain fruitfulness to

their wives, and entail more certain health upon their children. Tacitus describes the same custom among the Germans, and attributes to it the same good effects. “Sera juvenum venus, eoque
 “inexhausta pubertas; nec virgines festinantur;
 “eadem juvenita, similis proceritas, pares vali-
 “dique miscentur; ac robora parentum liberi
 “referunt.”*

Among the Indian men, it is deemed a mark of heroism to bear the most exquisite pain without complaining; upon this account they early inure themselves to burning part of their bodies with fire, or cutting them with sharp instruments. No young man can be admitted to the honours of manhood or war, who has not acquitted himself well in these trials of patience and fortitude. It is easy to conceive how much this contributes to give a tone to the nervous system, which renders it less subject to the occasional causes of diseases.

IV. We come now to speak of those customs which are common to both sexes: these are

* Cæsar, in his history of the Gallic war, gives the same account of the ancient Germans. His words are, “Quí
 “diutissimi impuberes permanserunt, maximam inter suos
 “ferunt laudem: hoc ali staturam, ali vires, nervasque con-
 “firmari putant.” Lib. vi. xxi.

PAINTING, and the use of the COLD BATH. The practice of anointing the body with oil is common to the savages of all countries; in warm climates it is said to promote longevity, by checking excessive perspiration. The Indians generally use bear's grease, mixed with a clay which bears the greatest resemblance to the colour of their skins. This pigment serves to lessen the sensibility of the extremities of the nerves; it moreover fortifies them against the action of those exhalations, which we shall mention hereafter as a considerable source of their diseases. The COLD BATH likewise fortifies the body, and renders it less subject to those diseases, which arise from the extremes and vicissitudes of heat and cold. We shall speak hereafter of the Indian manner of using it.

It is a practice among the Indians never to drink before dinner, when they work or travel. Experience teaches, that filling the stomach with cold water in the forenoon weakens the appetite, and makes the system more sensible of heat and fatigue.

The state of society among the Indians excludes the influence of most of those passions which disorder the body. The turbulent effects of anger are concealed in deep and lasting resentments.

Envy and ambition are excluded by their equality of power and property. Nor is it necessary that the perfections of the whole sex should be ascribed to one, to induce them to marry. “The weakness of love (says Dr. Adam Smith) which is so much indulged in ages of humanity and politeness, is regarded among savages as the most unpardonable effeminacy. A young man would think himself disgraced for ever, if he showed the least preference of one woman above another, or did not express the most complete indifference, both about the time when, and the person to whom, he was to be married.”* Thus are they exempted from those violent or lasting diseases, which accompany the several stages of such passions in both sexes among civilized nations.

It is remarkable that there are no deformed Indians. Some have suspected, from this circumstance, that they put their deformed children to death; but nature here acts the part of an unnatural mother. The severity of the Indian manners destroys them.†

* Theory of Moral Sentiments.

† Since the intercourse of the white people with the Indians, we find some of them deformed in their limbs. This deformity, upon inquiry, appears to be produced by those

From a review of the customs of the Indians, we need not be surprised at the stateliness, regularity of features, and dignity of aspect, by which they are characterized. Where we observe these among ourselves, there is always a presumption of their being accompanied with health, and a strong constitution. The circulation of the blood is more languid in the Indians, than in persons who are in the constant exercise of the habits of civilized life. Out of eight Indian men, whose pulses I once examined at the wrists, I did not meet with one, in whom the artery beat more than sixty strokes in a minute.

The marks of old age appear more early among Indian, than among civilized, nations.

Having finished our inquiry into the physical customs of the Indians, we shall now proceed to inquire into their diseases.

A celebrated professor of anatomy has asserted, that we could not tell, by reasoning *à priori*, that the body was mortal, so intimately woven with its texture are the principles of life. Lord Bacon declares that the only cause of death, which is na-

accidents, quarrels, &c. which have been introduced among them by spirituous liquors.

tural to man, is that from old age ; and complains of the imperfection of physic, in not being able to guard the principle of life until the whole of the oil that feeds it is consumed. We cannot as yet admit this proposition of our noble philosopher. In the inventory of the grave, in every country, we find more of the spoils of youth and manhood than of age. This must be attributed to moral as well as physical causes.

We need only recollect the custom among the Indians, of sleeping in the open air in a variable climate ; the alternate action of heat and cold upon their bodies, to which the warmth of their cabins exposes them ; their long marches ; their excessive exercise ; their intemperance in eating, to which their long fasting and their public feasts naturally prompt them ; and, lastly, the vicinity of their habitations to the banks of rivers ; in order to discover the empire of diseases among them, in every stage of their lives. They have in vain attempted to elude the general laws of mortality, while their mode of life subjects them to these remote, but certain, causes of diseases.

From what we know of the action of these powers upon the human body, it will hardly be necessary to appeal to facts, to determine that FEVERS

constitute 'the only diseases among the Indians. These fevers are occasioned by the insensible qualities of the air. Those which are produced by cold and heat are of the inflammatory kind, such as pleurisies, peripneumonies, and rheumatisms. Those which are produced by the insensible qualities of the air, or by putrid exhalations, are intermitting, remitting, inflammatory, and malignant, according as the exhalations are combined with more or less heat or cold. The DYSENTERY (which is an Indian disease) comes under the class of fevers. It appears to be the febris introversa of Dr. Sydenham.

The Indians are subject to ANIMAL and VEGETABLE POISONS. The effects of these upon the body are, in some degree, analogous to the exhalations we have mentioned. When they do not bring on sudden death, they produce, according to their force, either a common inflammatory, or a malignant, fever.

The SMALL POX and the VENEREAL DISEASE were communicated to the Indians of North America by the Europeans. Nor can I find that they were ever subject to the SCURVY. Whether this was obviated by their method of preserving their flesh, or by their mixing it at all times with vegetables, I shall not undertake to determine. Their

peculiar customs and manners seem to have exempted them from this, as well as from the common diseases of the skin.

I have heard of two or three cases of the GOUT among the Indians, but it was only among those who had learned the use of rum from the white people. A question naturally occurs here, and that is, why does not the gout appear more frequently among that class of people, who consume the greatest quantity of rum among ourselves? To this I answer, that the effects of this liquor upon those enfeebled people are too sudden, and violent, to admit of their being thrown upon the extremities; as we know them to be among the Indians. They appear only in visceral obstructions, and a complicated train of chronic diseases. Thus putrid miasmata are sometimes too strong to bring on a fever, but produce instant debility and death. The gout is seldom heard of in Russia, Denmark, or Poland. Is this occasioned by the vigour of constitution peculiar to the inhabitants of those northern countries? or is it caused by their excessive use of spirituous liquors, which produce the same chronic complaints among them, which we said were common among the lower class of people in this country? The similarity of their diseases makes the last of these suppositions the

most probable. The effects of wine, like tyranny in a well formed government, are felt first in the extremities ; while spirits, like a bold invader, seize at once upon the vitals of the constitution.

After much inquiry, I have not been able to find a single instance of *FATUITY* among the Indians, and but few instances of *MELANCHOLY* and *MADNESS* ; nor can I find any accounts of diseases from *WORMS* among them. Worms are common to most animals ; they produce diseases only in weak, or increase them in strong, constitutions.* Hence they have no place in the nosological systems of physic. Nor is *DENTITION* accompanied by disease among the Indians. The facility with which the healthy children of healthy parents cut their teeth, among civilized nations, gives us reason to conclude that the Indian children never suffer from this quarter.

The Indians appear moreover to be strangers to diseases and pains in the teeth.

* Indian children are not exempted from worms. It is common with the Indians, when a fever in their children is ascribed by the white people to worms (from their being discharged occasionally in their stools) to say, " the fever makes the worms come, and not the worms the fever."

The employments of the Indians subject them to many accidents ; hence we sometimes read of WOUNDS, FRACTURES, and LUXATIONS, among them.

Having thus pointed out the natural diseases of the Indians, and shown what diseases are foreign to them, we may venture to conclude, that FEVERS, OLD AGE, CASUALTIES, and WAR, are the only natural outlets of human life. War is nothing but a disease ; it is founded in the imperfection of political bodies, just as fevers are founded on the weakness of the animal body. Providence in these diseases seems to act like a mild legislature, which mitigates the severity of death, by inflicting it in a manner the least painful, upon the whole, to the patient and the survivors.

Let us now inquire into the REMEDIES of the Indians. These, like their diseases, are simple, and few in number. Among the first of them, we shall mention the POWERS OF NATURE. Fevers, we said formerly, constituted the chief of the diseases among the Indians ; they are likewise, in the hands of nature, the principal instruments to remove the evils which threaten her dissolution ; but the event of these efforts of nature, no doubt, soon convinced the Indians of the danger of trust-

ing her in all cases ; and hence, in the earliest accounts we have of their manners, we read of persons who were intrusted with the office of physicians.

It will be difficult to find out the exact order in which the Indian remedies were suggested by nature, or discovered by art ; nor will it be easy to arrange them in proper order. I shall, however, attempt it, by reducing them to NATURAL and ARTIFICIAL.

To the class of NATURAL REMEDIES belongs the Indian practice, of abstracting from their patients all kinds of stimulating aliment. The compliance of the Indians with the dictates of nature, in the early stage of a disease, no doubt, prevents, in many cases, their being obliged to use any other remedy. They follow nature still closer, in allowing their patients to drink plentifully of cold water ; this being the only liquor a patient calls for in a fever.

Sweating is likewise a natural remedy. It was probably suggested by observing fevers to be terminated by it. I shall not inquire how far these sweats are essential to the crisis of a fever. The Indian mode of procuring this evacuation is as fol-

lows: the patient is confined in a close tent, or wigwam, over a hole in the earth, in which a red hot stone is placed; a quantity of water is thrown upon this stone, which instantly involves the patient in a cloud of vapour and sweat; in this situation he rushes out, and plunges himself into a river, from whence he retires to his bed. If the remedy has been used with success, he rises from his bed in four and twenty hours, perfectly recovered from his indisposition. This remedy is used not only to cure fevers, but remove that uneasiness which arises from fatigue of body.

A third natural remedy among the Indians is, **PURGING**. The fruits of the earth, the flesh of birds, and other animals feeding upon particular vegetables, and, above all, the spontaneous efforts of nature, early led the Indians to perceive the necessity and advantages of this evacuation.

VOMITS constitute their fourth natural remedy. They were probably, like the former, suggested by nature, and accident. The ipecacuanha is one of the many roots they employ for that purpose.

The **ARTIFICIAL REMEDIES** made use of by the Indians are, **BLEEDING**, **CAUSTICS**, and **ASTRINGENT** medicines. They confine bleeding

entirely to the part affected. To know that opening a vein in the arm, or foot, would relieve a pain in the head or side, supposes some knowledge of the animal economy, and therefore marks an advanced period in the history of medicine.

Sharp stones and thorns are the instruments they use to procure a discharge of blood.

We have an account of the Indians using something like a **POTENTIAL CAUSTIC**, in obstinate pains. It consists of a piece of rotten wood, called *punk*, which they place upon the part affected, and afterwards set it on fire : the fire gradually consumes the wood, and its ashes burn a hole in the flesh.

The undue efforts of nature, in those fevers which are connected with a diarrhœa, or dysentery, together with those hemorrhages to which their mode of life exposed them, necessarily led them to an early discovery of some **ASTRINGENT VEGETABLES**. I am uncertain whether the Indians rely upon astringent, or any other vegetables, for the cure of the intermitting fever. This disease among them probably requires no other remedies than the cold bath, or cold air. Its greater obstinacy, as well as frequency, among

ourselves, must be sought for in the greater feebleness of our constitutions, and in that change which our country has undergone, from meadows, mill-dams, and the cutting down of woods ; whereby morbid exhalations have been multiplied, and their passage rendered more free, through every part of the country.

This is a short account of the remedies of the Indians. If they are simple, they are, like their eloquence, full of strength ; if they are few in number, they are accommodated, as their languages are to their ideas, to the whole of their diseases.

We said, formerly, that the Indians were subject to ACCIDENTS, such as wounds, fractures, and the like. In these cases, nature performs the office of a surgeon. We may judge of her qualifications for this office, by observing the marks of wounds and fractures which are sometimes discovered on wild animals. But further, what is the practice of our modern surgeons in these cases ? Is it not to lay aside plaisters and ointments, and trust the whole to nature ? Those ulcers, which require the assistance of mercury, bark, and a particular regimen, are unknown to the Indians.

The HEMORRHAGES which sometimes follow their wounds are restrained, by plunging themselves into cold water, and thereby producing a constriction upon the bleeding vessels.

Their practice of attempting to recover DROWNED PEOPLE is irrational and unsuccessful. It consists in suspending the patient by the heels, in order that the water may flow from his mouth. This practice is founded on a belief, that the patient dies from swallowing an excessive quantity of water. But modern observations teach us, that drowned people die from another cause. This discovery has suggested a method of cure, directly opposite to that in use among the Indians; and has shown us that the practice of suspending by the heels is hurtful.

I do not find that the Indians ever suffer in their limbs from the action of COLD upon them. Their mokasons,* by allowing their feet to move freely, and thereby promoting the circulation of the blood, defend their lower extremities in the day-time, and their practice of sleeping with their feet near a fire defends them from the morbid effects of cold at night. In those cases, where the motion

* Indian shoes.

of their feet in their mokasons is not sufficient to keep them warm, they break the ice, and restore their warmth, by exposing them for a short time to the action of cold water.*

We have heard much of their specific antidotes to the VENEREAL DISEASE. In the accounts of these anti-venereal medicines, some abatement should be made for that love of the marvellous, and of novelty, which are apt to creep into the writings of travellers and physicians. How many medicines, which were once thought infallible in this disease, are now rejected from the *materia medica*! I have found upon inquiry that the Indians always assist their medicines in this disease, by a regimen which promotes perspiration. Should we allow that mercury acts as a specific in destroying this disease, it does not follow that it is proof against the efficacy of medicines, which act more mechanically upon the body.†

* It was remarked in Canada, in the winter of the year 1759, during the war before last, that none of those soldiers who wore mokasons were frost-bitten, while few of those escaped that were much exposed to the cold who wore shoes.

† I cannot help suspecting the anti-venereal qualities of the lobelia, *ceanothus* and *ranunculus*, spoken of by Mr. Kalm, in the *Memoirs of the Swedish Academy*. Mr Hand informed me, that the Indians rely chiefly upon a plentiful

There cannot be a stronger mark of the imperfect state of knowledge in medicine among the Indians, than their method of treating the SMALL-POX. We are told that they plunge themselves in cold water in the beginning of the disease, and that it often proves fatal to them.

Travellers speak in high terms of the Indian ANTIDOTES TO POISONS. We must remember that many things have been thought poisonous, which later experience hath proved to possess no unwholesome quality. Moreover, the uncertainty and variety, in the operation of poisons, renders it extremely difficult to fix the certainty of the antidotes to them. How many specifics have derived their credit for preventing the hydrophobia, from persons being wounded by animals, who were not in a situation to produce that disease ! If we may judge of all the Indian antidotes to poisons, by those which have fallen into our hands, we have little reason to ascribe much to them in any cases whatever.

I have heard of their performing several remarkable cures upon STIFF JOINTS, by an infusion of use of the decoctions of the pine-trees for the cure of the venereal disease. He added, moreover, that he had often known this disease prove fatal to them.

certain herbs in water. The mixture of several herbs together in this infusion calls in question the specific efficacy of each of them. I cannot help attributing the whole success of this remedy to the great heat of the water in which the herbs were boiled, and to its being applied for a long time to the part affected. We find the same medicine to vary frequently in its success, according to its strength, or to the continuance of its application. De Haen attributes the good effects of electricity entirely to its being used for several months.

I have met with one case upon record, of their aiding nature in PARTURITION. Captain Carver gives us an account of an Indian woman in a difficult labour being suddenly delivered, in consequence of a general convulsion induced upon her system by stopping, for a short time, her mouth and nose, so as to obstruct her breathing.

We are sometimes amused with accounts of Indian remedies for the DROPSY, EPILEPSY, COLIC, GRAVEL, and GOUT. If, with all the advantages which modern physicians derive from their knowledge in anatomy, chemistry, botany, and philosophy; if, with the benefit of discoveries communicated from abroad, as well as handed down from our ancestors, by more certain me-

thods than tradition, we are still ignorant of certain remedies for these diseases ; what can we expect from the Indians, who are not only deprived of these advantages, but want our chief motive, the sense of the pain and danger of those diseases, to prompt them to seek for such remedies to relieve them ? There cannot be a stronger proof of their ignorance of proper remedies for new or difficult diseases, than their having recourse to enchantment. But to be more particular ; I have taken pains to inquire into the success of some of these Indian specifics, and have never heard of one well attested case of their efficacy. I believe they derive all their credit from our being ignorant of their composition. The influence of secrecy is well known in establishing the credit of a medicine. The *sal seignette* was supposed to be an infallible medicine for the intermitting fever, while the manufactory of it was confined to an apothecary at Rochelle ; but it lost its virtues, as soon as it was found to be composed of the acid of tartar and the fossil alkali. Dr. Ward's famous pill and drop ceased to do wonders in scrophulous cases, as soon as he bequeathed to the world his receipts for making them.

I foresee an objection to what has been said concerning the remedies of the Indians, drawn from

that knowledge which experience gives to a mind intent upon one subject. We have heard much of the perfection of their senses of seeing and hearing. An Indian, we are told, will discover, not only a particular tribe of Indians by their footsteps, but the distance of time in which they were made. In those branches of knowledge which relate to hunting and war, the Indians have acquired a degree of perfection, that has not been equalled by civilized nations. But we must remember, that medicine among them does not possess the like advantages with the arts of war and hunting, of being the *chief* object of their attention. The physician and the warrior are united in one character; to render him as able in the former as he is in the latter profession would require an entire abstraction from every other employment, and a familiarity with external objects, which are incompatible with the wandering life of savages.

Thus have we finished our inquiry into the diseases and remedies of the Indians in North America. We come now to inquire into the diseases and remedies of civilized nations.

Nations differ in their degrees of civilization. We shall select one for the subject of our inquiries,

which is most familiar to us ; I mean the British nation. Here we behold subordination and classes of mankind established, by government, commerce, manufactures, and certain customs, common to most of the civilized nations of Europe. We shall trace the origin of their diseases through their customs, in the same manner as we did those of the Indians.

I. It will be sufficient to name the degrees of heat, the improper aliment, the tight dresses, and the premature studies, children are exposed to, in order to show the ample scope for diseases, which is added to the original defect of stamina they derive from their ancestors.

II. Civilization rises in its demands upon the health of women. Their fashions ; their dress and diet ; their eager pursuits and ardent enjoyment of pleasure ; their indolence, and undue evacuations in pregnancy ; their cordials, hot regimen, and neglect, or use of art, in child-birth ; are all so many inlets to disease.

Humanity would fain be silent, while philosophy calls upon us to mention the effects of interested marriages, and of disappointments in love, increased by that concealment, which the tyranny

of custom has imposed upon the sex.* Each of these exaggerates the natural, and increases the number of artificial, diseases among women.

III. The diseases introduced by civilization extend themselves through every class and profession among men. How fatal are the effects of idleness and intemperance among the rich, and of hard labour and penury among the poor! What pallid looks are contracted by the votaries of science, from hanging over the “sickly taper!” How many diseases are entailed upon manufacturers, by the materials in which they work, and the posture of their bodies! What monkish diseases do we observe, from monkish continence and monkish vices! We pass over the increase of accidents, from building, sailing, riding, and the like. War, as if too slow in destroying the human species,

* “Married women are more healthy and long-lived than single women. The registers, examined by Mr. Muret, confirm this observation; and show, particularly, that of equal numbers of single and married women, between fifteen and twenty-five years of age, more of the former died than of the latter, in the proportion of two to one: the consequence, therefore, of following nature must be favourable to health among the female sex.” Supplement to Price’s Observations on Reversionary Payments, p. 357.

calls in a train of diseases peculiar to civilized nations. What havoc have the corruption and monopoly of provisions, a damp soil, and an unwholesome sky, made, in a few days, in an army ! The achievements of British valour, at the Havannah, in the last war, were obtained at the expence of 9,000 men, 7,000 of whom perished with the West India fever.* Even our modern discoveries in geography, by extending the empire of commerce, have likewise extended the empire of diseases. What desolation have the East and West Indies made of British subjects ! It has been found, upon a nice calculation, that only ten of a hundred Europeans live above seven years after they arrive in the island of Jamaica.

* The modern writers upon the diseases of armies wonder that the Greek and Roman physicians have left us nothing upon that subject. But may not *most* of the diseases of armies be produced by the different manner in which wars are carried on by the modern nations ? The discoveries in geography, by extending the field of war, expose soldiers to many diseases, from long voyages, and a *sudden* change of climate, which were unknown to the armies of former ages. Moreover, the form of the weapons, and the variety in the military exercises, of the Grecian and Roman armies gave a vigour to the constitution, which can never be acquired by the use of muskets and artillery.

IV. It would take up too much of our time to point out all the customs, both *physical* and *moral*, which influence diseases among both sexes. The former have engendered the seeds of diseases in the human body itself: hence the origin of catarrhs, jail and military fevers, with a long train of other diseases, which compose so great a part of our books of medicine. The latter likewise have a large share in producing diseases. I am not one of those modern philosophers, who derive the vices of mankind from the influence of civilization; but I am safe in asserting, that their number and malignity increase with the refinements of polished life. To prove this, we need only survey a scene too familiar to affect us: it is a bedlam; which injustice, inhumanity, avarice, pride, vanity, and ambition, have filled with inhabitants.

Thus have I briefly pointed out the customs, which influence the diseases of civilized nations. It remains now that we take notice of their diseases. Without naming the many new fevers, fluxes, hemorrhages, swellings from water, wind, flesh, fat, pus, and blood; foulness on the skin, from cancers, leprosy, yawes, poxes, and itch; and, lastly, the gout, the hysteria, and the hypochondriasis, in all their variety of known and un-

known shapes ; I shall sum up all that is necessary upon this subject, by adding, that the number of diseases which belong to civilized nations, according to Doctor Cullen's nosology, amounts to 1387 ; the single class of nervous diseases form 612 of this number.

Before we proceed to speak of the remedies of civilized nations, we shall examine into the abilities of NATURE in curing their diseases. We found her active and successful in curing the diseases of the Indians. Are her strength, wisdom, or benignity, equal to the increase of those dangers, which threaten her dissolution among civilized nations ? In order to answer this question, it will be necessary to explain the meaning of the term nature.

By nature, in the present case, I understand nothing but *physical necessity*. This at once excludes every thing like intelligence from her operations : these are all performed in obedience to the same laws, which govern vegetation in plants, and the intestine motions of fossils. They are as truly mechanical as the laws of gravitation, electricity, or magnetism. A ship, when laid on her broadside by a wave, or a sudden blast of wind, rises by the simple laws of her mechanism ; but

suppose this ship to be attacked by fire, or a water-spout, we are not to call in question the skill of the ship-builder, if she be consumed by the one, or sunk by the other. In like manner, the Author of nature hath furnished the body with powers to preserve itself from its natural enemies ; but when it is attacked by those civil foes, which are bred by the peculiar customs of civilization, it resembles a company of Indians, armed with bows and arrows, against the complicated and deadly machinery of fire-arms. To place this subject in a proper light, I shall deliver a history of the operations of nature in a few of the diseases of civilized nations.

I. There are cases, in which nature is still successful in curing diseases.

In fevers, she still deprives us of our appetite for animal food, and imparts to us a desire for cool air and cold water.

In hemorrhages, she produces a faintness, which occasions a coagulum in the open vessels ; so that the further passage of blood through them is obstructed.

In wounds of the flesh and bones she discharges foreign matter, by exciting an inflammation, and supplies the waste of both with new flesh and bone.

II. There are cases, where the efforts of nature are too feeble to do service, as in malignant and chronic fevers.

III. There are cases, where the efforts of nature are over-proportioned to the strength of the disease, as in the cholera morbus and dysentery.

IV. There are cases, where nature is idle, as in the atonic stages of the gout, the cancer, the epilepsy, the mania, the venereal disease, the apoplexy, and the tetanus.*

V. There are cases, in which nature does mischief. She wastes herself with an unnecessary fever in a dropsy and consumption. She throws a plethora upon the brain and lungs in the apoplexy and peripneumonia notha. She ends a pleurisy and peripneumony in a vomica, or empyema. She creates an unnatural appetite for food in the hypochondriac disease. And, lastly,

* Hoffman de hypothesium medicarum damno, sect. xv.

she drives the melancholy patient to solitude, where, by brooding over the subject of his insanity, he increases his disease.

We are accustomed to hear of the salutary kindness of nature in alarming us with pain, to prompt us to seek for a remedy. But,

VI. There are cases, in which she refuses to send this harbinger of the evils which threaten her, as in the aneurism, scirrhus, and stone in the bladder.

VII. There are cases, where the pain is not proportioned to the danger, as in the tetanus, consumption, and dropsy of the head. And,

VIII. There are cases, where the pain is over-proportioned to the danger, as in the paronychia and tooth-ache.

This is a short account of the operations of nature in the diseases of civilized nations. A lunatic might as well plead against the sequestration of his estate, because he once enjoyed the full exercise of his reason, or because he still had lucid intervals, as nature be exempted from the charges we have brought against her.

But this subject will receive strength from considering the REMEDIES of civilized nations. All the products of the vegetable, fossil; and animal kingdoms, tortured, by heat and mixture, into an almost infinite variety of forms; bleeding, cupping, artificial drains by setons, issues, and blisters; exercise, active and passive; voyages and journies; baths, warm and cold; waters, saline, aërial, and mineral; food, by weight and measure; the royal touch; enchantment; miracles; in a word, the combined discoveries of natural history and philosophy united into a system of materia medica all show, that although physicians are in speculation the servants, yet in practice they are the masters, of nature. The whole of their remedies seem contrived on purpose to arouse, assist, restrain, and controul her operations,

There are some truths, like certain liquors, which require strong heads to bear them. I feel myself protected from the prejudices of vulgar minds, when I reflect that I am delivering these sentiments in a society of philosophers.

Let us now take a COMPARATIVE VIEW of the diseases and remedies of the Indians with those of civilized nations. We shall begin with their diseases.

In our account of the diseases of the Indians we beheld death executing his commission, it is true ; but then his dart was hid in a mantle, under which he concealed his shape. But among civilized nations we behold him multiplying his weapons, in proportion to the number of organs and functions in the body ; and pointing each of them in such a manner, as to render his messengers more terrible than himself.

We said formerly that fevers constituted the chief diseases of the Indians. According to Doctor Sydenham's computation, above 66,000 out of 100,000 died of fevers, in London, about 100 years ago ; but fevers now constitute but a little more than one-tenth part of the diseases of that city. Out of 21,780 persons who died in London, between December, 1770, and December, 1771, only 2273 died of simple fevers. I have more than once heard Doctor Huck complain, that he could find no marks of epidemic fevers in London, as described by Dr. Sydenham. London has undergone a revolution in its manners and customs since Doctor Sydenham's time. New diseases, the offspring of luxury, have supplanted fevers ; and the few that are left are so complicated with other diseases, that their connection can no longer be discovered with an epidemic constitution of the

year. The pleurisy and peripneumony, those inflammatory fevers of strong constitutions, are now lost in catarrhs, or colds, which, instead of challenging the powers of nature or art to a fair combat, insensibly undermine the constitution, and bring on an incurable consumption. Out of 22,434 who died in London, between December, 1769, and the same month in 1770, 4594 perished with that British disease. Our countryman, Doctor Maclurg, has ventured to foretell that the gout will be lost in a few years, in a train of hypochondriac, hysteric, and bilious diseases. In like manner, may we not look for a season, when fevers, the natural diseases of the human body, will be lost in an inundation of artificial diseases, brought on by the modish practices of civilization?

It may not be improper to compare the PROGNOSIS of the Indians, in diseases, with that of civilized nations, before we take a comparative view of their remedies.

The Indians are said to be successful in predicting the events of diseases. While diseases are simple, the marks which distinguish them, or characterize their several stages, are generally uniform, and obvious to the most indifferent observer. These marks afford so much certainty, that the In-

dians sometimes kill their physicians for a false prognosis, charging the death of the patient to their carelessness, or ignorance. They estimate the danger of their patients by the degrees of appetite; while an Indian is able to eat, he is looked upon as free from danger. But when we consider the number and variety in the signs of diseases among civilized nations, together with the shortness of life, the fallacy of memory, and the uncertainty of observation, where shall we find a physician willing to risk his reputation, much less his life, upon the prediction of the event of our acute diseases? We can derive no advantage from the simple sign, by which the Indians estimate the danger of their patients; for we daily see a want of appetite for food in diseases which are attended with no danger; and we sometimes observe an unusual degree of this appetite to precede the agonies of death. I honour the name of HIPPOCRATES: but forgive me, ye votaries of antiquity, if I attempt to pluck a few gray hairs from his venerable head. I was once an idolater at his altar, nor did I turn apostate from his worship, till I was taught, that not a tenth part of his prognostics corresponded with modern experience, or observation. The pulse,* urine, and sweats, from

* Doctor Cullen used to inform his pupils, that, after forty years' experience, he could find no relation between his own

which the principal signs of life and death have been taken, are so variable, in most of the acute diseases of civilized nations, that the wisest physicians have in some measure excluded the prognosis from being a part of their profession.

I am here insensibly led to make an apology for the instability of the theories and practice of physic. The theory of physic is founded upon the laws of the animal economy. These (unlike the laws of the mind, or the common laws of matter) do not appear at once, but are gradually brought to light by the phænomena of diseases. The success of nature in curing the simple diseases of Saxony laid the foundation for the *ANIMA MEDICA* of Doctor STAHL. The endemics of Holland* led Doctor BOERHAAVE to seek for the

observations on the pulse and those made by Doctor Solano. The climate and customs of the people in Spain being so different from the climate and customs of the present inhabitants of Britain may account for the diversity of their observations. Doctor Heberden's remarks upon the pulse, in the second volume of the Medical Transactions, are calculated to show how little the issue of diseases can be learned from it.

* "The scurvy is very frequent in Holland; and draws its origin partly from their strong food, sea-fish, and smoked

causes of all diseases in the FLUIDS. And the universal prevalence of diseases of the NERVES, in Great Britain, led Doctor CULLEN to discover their peculiar laws, and to found a system upon them; a system, which will probably last till some new diseases are let loose upon the human species, which shall unfold other laws of the animal economy.

It is in consequence of this fluctuation in the principles and practice of physic being so necessarily connected with the changes in the customs of civilized nations, that old and young physicians so often disagree in their opinions and practices. And it is by attending to the constant changes in these customs of civilized nations, that those physicians have generally become the most eminent, who have soonest emancipated themselves from the tyranny of the schools of physic; and have occasionally accommodated their principles and

flesh, and partly from their dense and moist air, together with their bad water." Hoffman on Endemical Distempers.

"We are now in North-Holland; and I have never seen, among so few people, so many infected with the leprosy as here. They say the reason is, because they eat so much fish." Howell's Familiar Letters.

practice to the changes in diseases.* This variety in diseases, which is produced by the changes in the customs of civilized nations, will enable us to account for many of the contradictions which are to be found in authors of equal candour and abilities, who have written upon the *materia medica*.

In forming a comparative view of the REMEDIES of the Indians, with those of civilized nations, we shall remark, that the want of success in a medicine is occasioned by one of the following causes:

First, our ignorance of the disease. Secondly, an ignorance of a suitable remedy. Thirdly, a want of efficacy in the remedy.

* We may learn, from these observations, the great impropriety of those Egyptian laws, which oblige physicians to adopt, in all cases, the prescriptions which had been collected, and approved of, by the physicians of former ages. Every change in the customs of civilized nations produces a change in their diseases, which calls for a change in their remedies. What havoc would plentiful bleeding, purging, and small beer, formerly used with so much success by Dr. Sydenham in the cure of fevers, now make upon the enfeebled citizens of London! The fevers of the same, and of more southern latitudes, still admit of such antiphlogistic remedies. In the room of these, bark, wine, and other cordial medicines, are prescribed in London in almost every kind of fever.

Considering the violence of the diseases of the Indians, it is probable their want of success is always occasioned by a want of efficacy in their medicines. But the case is very different among the civilized nations. Dissections daily convince us of our ignorance of the seats of diseases, and cause us to blush at our prescriptions. How often are we disappointed in our expectation from the most certain and powerful of our remedies, by the negligence or obstinacy of our patients ! What mischief have we done under the belief of false facts (if I may be allowed the expression) and false theories ! We have assisted in multiplying diseases. We have done more—we have increased their mortality.

I shall not pause to beg pardon of the faculty, for acknowledging, in this public manner, the weaknesses of our profession. I am pursuing Truth, and while I can keep my eye fixed upon my guide, I am indifferent whither I am led, provided she is my leader.

But further, the Indian submits to his disease, without one fearful emotion from his doubtfulness of its event ; and at last meets his fate, without an anxious wish for futurity : except it is of being admitted to an “equal sky,” where

“His faithful dog shall bear him company.”

But among civilized nations, the influence of a false religion in good, and of a true religion in bad, men has converted even the fear of death into a disease. It is this original distemper of the imagination which renders the plague most fatal, upon its first appearance in a country.

Under all these disadvantages in the state of medicine, among civilized nations, do more in proportion die of the diseases peculiar to them, than of fevers, casualties, and old age, among the Indians? If we take our account from the city of London, we shall find this to be the case. Near a twentieth part of its inhabitants perish one year with another. Nor does the natural increase of inhabitants supply this yearly waste. If we judge from the bills of mortality, the city of London contains fewer inhabitants, by several thousands, than it did forty years ago. It appears from this fact, and many others of a like nature, which might be adduced, that although the difficulty of supporting children, together with some peculiar customs of the Indians, which we mentioned, limit their number, yet they multiply faster, and die in a smaller proportion, than civilized nations, under the circumstances we have described. The

Indians, we are told, were numerous in this country, before the Europeans settled among them. Travellers agree likewise in describing numbers of both sexes, who exhibited all the marks of extreme old age. It is remarkable that age seldom impairs the faculties of their minds.

The mortality peculiar to those Indian tribes who have mingled with the white people must be ascribed to the extensive mischief of spirituous liquors. When these have not acted, they have suffered from having accommodated themselves too suddenly to the European diet, dress, and manners. It does not become us to pry too much into futurity; but if we may judge from the fate of the original natives of Hispaniola, Jamaica, and the provinces on the continent, we may venture to foretell, that, in proportion as the white people multiply, the Indians will diminish; so that in a few centuries they will probably be entirely extirpated.*

* Even the influence of CHRISTIAN principles has not been able to put a stop to the mortality introduced among the Indians, by their intercourse with the Europeans. Dr. Cotton Mather, in a letter to sir William Ashurst, printed in Boston, in the year 1705, says, "that about five years before there were about thirty Indian congregations in the southern parts of the province of Massachusetts-Bay." The

It may be said, that health among the Indians, like insensibility to cold and hunger, is proportioned to their need of it ; and that the less degrees, or entire want of health, are no interruption to the ordinary business of civilized life.

To obviate this supposition, we shall first attend to the effects of a single disease in those people, who are the principal wheels in the machine of civil society. Justice has stopt its current, victories have been lost, wars have been prolonged, and embassies delayed, by the principal actors in these departments of government being suddenly laid up by a fit of the gout. How many offences are daily committed against the rules of good breeding, by the tedious histories of our diseases, which compose so great a part of modern conversation ! What sums of money have been lavished in foreign coun-

same author, in his history of New-England, says, " That in the islands of Nantucket and Martha's Vineyard there were 3000 *adult* Indians, 1600 of whom professed the christian religion." At present there is but *one* Indian congregation in the whole Massachusetts province.

It may serve to extend our knowledge of diseases, to remark, that epidemics were often observed to prevail among the Indians in Nantucket, without affecting the white people.

tries in pursuit of health!* Families have been ruined by the unavoidable expences of medicines and watering-places. In a word, the swarms of beggars, which infest so many of the European countries, urge their petitions for charity chiefly by arguments derived from real or counterfeit diseases, which render them incapable of supporting themselves.†

But may not civilization, while it abates the violence of natural diseases, increase the lenity of those that are artificial, in the same manner that it lessens the strength of natural vices by multiplying them? To answer this question, it will only be necessary to ask another: Who would exchange the heat, thirst, and uneasiness of a fever, for one fit of the colic or stone?

The history of the number, combination, and fashions of the remedies we have given, may serve

* It is said there are seldom less than 20,000 British subjects in France and Italy; one half of whom reside or travel in those countries upon the account of their health.

† Templeman computes, that Scotland contains 1,500,000 inhabitants; 100,000 of whom, according to Mr. Fletcher, are supported at the public expence. The proportion of poor people is much greater in England, Ireland, France, and Italy.

to humble the pride of philosophy ; and to convince us, that with all the advantages of the whole circle of sciences, we are still ignorant of antidotes to many of the diseases of civilized nations. We sometimes sooth our ignorance, by reproaching our idleness in not investigating the remedies peculiar to this country. We are taught to believe that every herb that grows in our woods is possessed of some medicinal virtue, and that Heaven would be wanting in benignity, if our country did not produce remedies for all the different diseases of its inhabitants. It would be arrogating too much, to suppose that man was the only creature in our world for whom vegetables grow. The beasts, birds, and insects, derive their sustenance either directly or indirectly from them ; while many of them were probably intended, from their variety in figure, foliage, and colour, only to serve as ornaments for our globe. It would seem strange that the Author of nature should furnish every spot of ground with medicines adapted to the diseases of its inhabitants, and at the same time deny it the more necessary articles of food and clothing. I know not whether Heaven has provided every country with antidotes even to the *natural* diseases of its inhabitants. The intermitting fever is common in almost every corner of the globe ; but a sovereign remedy for it has been discovered only

in South America. The combination of bitter and astringent substances, which serve as a succedaneum to the Peruvian bark, is as much a preparation of art, as calomel or tartar emetic. Societies stand in need of each other as much as individuals; and the goodness of the Deity remains unimpeached, when we suppose that he intended medicines to serve (with other articles) to promote that knowledge, humanity and politeness, among the inhabitants of the earth, which have been so justly attributed to commerce.

We have no discoveries in the *materia medica* to hope for from the Indians in North America. It would be a reproach to our schools of physic, if modern physicians were not more successful than the Indians, even in the treatment of their own diseases.

Do the blessings of civilization compensate for the sacrifice we make of natural health, as well as of natural liberty? This question must be answered under some limitations. When natural liberty is given up for laws which enslave instead of protecting us, we are immense losers by the exchange. Thus, if we arm the whole elements against our health, and render every pore in the body an ave-

nue for a disease, we pay too high a price for the blessings of civilization.

In governments which have departed entirely from their simplicity, partial evils are to be cured by nothing but an entire renovation of their constitution. Let the world bear with the professions of law, physic, and divinity; and let the lawyer, physician, and divine, yet learn to bear with each other. They are all necessary, in the present state of society. In like manner, let the woman of fashion forget the delicacy of her sex, and submit to be delivered by a man-midwife.* Let her snatch her offspring from her breast, and send it to repair the weakness of its stamina, with the milk of a ruddy cottager.† Let art supply the place of nature

* In the enervated age of Athens a law was passed, which confined the practice of midwifery only to the men. It was, however, repealed, upon a woman's dying in childbirth, rather than be delivered by a man-midwife. It appears from the bills of mortality in London and Dublin, that about one in seventy of those women die in childbirth, who are in the hands of midwives; but from the accounts of the lying-in hospitals in those cities, which are under the care of man-midwives, only one in a hundred and forty perishes in childbirth.

† There has been much common-place declamation against the custom among the great, of not suckling their

in the preparation and digestion of all our aliment. Let our fine ladies keep up their colour with carmine, and their spirits with ratifia; and let our fine gentlemen defend themselves from the excesses of heat and cold with lavender and hartshorn. These customs have become necessary in the corrupt stages of society. We must imitate, in these cases, the practice of those physicians, who consult the appetite only in diseases which do not admit of a remedy.

The state of a country, in point of population, temperance, and industry, is so connected with its diseases, that a tolerable idea may be formed of it,

children. Nurses were common in Rome, in the declension of the empire: hence we find Cornelia commended as a rare example of maternal virtue, as much for suckling her sons, as for teaching them eloquence. That nurses were common in Egypt, is probable from the contract which Pharaoh's daughter made with the unknown mother of Moses, to allow her wages for suckling her own child. The same degrees of civilization require the same customs. A woman, whose times for eating and sleeping are constantly interrupted by the calls of enervating pleasures, must always afford milk of an unwholesome nature. It may truly be said of a child doomed to live on this aliment, that, as soon as it receives its

———"breath,

It sucks in "the lurking principles of death."

by looking over its bills of mortality. HOSPITALS, with all their boasted advantages, exhibit at the same time monuments of the charity and depravity of a people.* The opulence of physicians, and

* “Aurengezebe, emperor of Persia, being asked, Why he did not build hospitals? said, *I will make my empire so rich, that there shall be no need of hospitals.* He ought to have said, I will begin by rendering my subjects rich, and then I will build hospitals.

“At Rome, the hospitals place every one at his ease, except those who labour, those who are industrious, those who have lands, and those who are engaged in trade.

“I have observed, that wealthy nations have need of hospitals, because fortune subjects them to a thousand accidents; but it is plain, that transient assistances are better than perpetual foundations. The evil is momentary; it is necessary, therefore, that the succour should be of the same nature, and that it be applied to particular accidents.” Spirit of Laws, b. xxiii. ch. 29.

It was reserved for the present generation to substitute in the room of public hospitals private DISPENSARIES for the relief of the sick. Philosophy and christianity alike concur in deriving praise and benefit from these excellent institutions. They exhibit something like an application of the mechanical powers to the purposes of benevolence; for in what other charitable institutions do we perceive so great a quantity of distress relieved by so small an expence?

the divisions of their offices, into those of surgery, pharmacy, and midwifery, are likewise proofs of the declining state of a country. In the infancy of the Roman empire, the priest performed the office of a physician; so simple were the principles and practice of physic. It was only in the declension of the empire, that physicians vied with the emperors of Rome in magnificence and splendour.*

* The first regular practitioners of physic in Rome were women and slaves. The profession was confined to them above six hundred years. The Romans, during this period, lived chiefly upon vegetables, particularly upon PULSE; and hence they were called, by their neighbours, PULTIFAGI. They were likewise early inured to the healthy employments of war and husbandry. Their diseases, of course, were too few and simple, to render the cure of them an object of liberal profession. When their diseases became more numerous and complicated, their investigation and cure required the aids of philosophy. The profession from this time became liberal; and maintained a rank with the other professions which are founded upon the imperfection and depravity of human institutions. Physicians are as necessary in the advanced stages of society as surgeons, although their office is less ancient and certain. There are many artificial diseases, in which they give certain relief; and even where their art fails, their prescriptions are still necessary, in order to smoothe the avenues of death.

I am sorry to add, in this place, that the number of patients in the HOSPITAL, and incurables in the ALMSHOUSE of this city, show that we are treading in the enervated steps of our fellow subjects in Britain. Our bills of mortality likewise show the encroachments of British diseases upon us. The NERVOUS FEVER has become so familiar to us, that we look upon it as a natural disease. Dr. Sydenham, so faithful in his history of fevers, takes no notice of it. Dr. Cadwallader informed me, that it made its first appearance in this city about five and twenty years ago. It will be impossible to name the CONSUMPTION, without recalling to our minds the memory of some friend or relation, who has perished within these few years by that disease. Its rapid progress among us has been unjustly attributed to the growing resemblance of our climate to that of Great-Britain. The HYS-TERIC and HYPOCHONDRIAC DISEASES, once peculiar to the chambers of the great, are now to be found in our kitchens and workshops. All these diseases have been produced by our having deserted the simple diet and manners of our ancestors.

The blessings of literature, commerce, and religion, were not *originally* purchased at the expence of health. The complete enjoyment of health is

as compatible with civilization, as the enjoyment of civil liberty. We read of countries, rich in every thing that can form national happiness and national grandeur, the diseases of which are nearly as few and simple as those of the Indians. We hear of no diseases among the Jews, while they were under their democratical form of government, except such as were inflicted by a supernatural power.* We should be tempted to doubt

* The principal employments of the Jews, like those of the Romans in their simple ages, consisted in war and husbandry. Their diet was plain, consisting chiefly of vegetables. Their only remedies were plaisters and ointments; which were calculated for those diseases which are produced by accidents. In proportion as they receded from their simple customs, we find artificial diseases prevail among them. The leprosy made its appearance in their journey through the wilderness. King Asa's pains in his feet were probably brought on by a fit of the gout. Saul and Nebuchadnezzar were afflicted with a melancholy. In the time of our Saviour, we find an account of all those diseases in Judea which mark the declension of a people; such as, the palsy, epilepsy, mania, blindness, hemorrhagia uterina, &c. It is unnecessary to suppose that they were let loose at this juncture, on purpose to give our Saviour an opportunity of making them the chief subject of his miracles. They had been produced from natural causes, by the gradual depravity of their manners. It is remarkable, that our Saviour chose those artificial diseases for the subject of his miracles, in preference to natural diseases. The efforts of nature, and

the accounts given of the populousness of that people, did we not see the practice of their simple customs producing nearly the same populousness in Egypt, Rome, and other countries of antiquity. The empire of China, it is said, contains more inhabitants than the whole of Europe. The political institutions of that country have exempted its inhabitants from a large share of the diseases of other civilized nations. The inhabitants of Switzerland, Denmark, Norway,* and Sweden, enjoy the chief advantages of civilization, without having surrendered for them the blessings of natural health. But it is unnecessary to appeal to ancient or remote nations, to prove that health is not incompatible with civilization. The inhabitants of many parts of New-England, particularly of the province of Connecticut, are but little affected by artificial diseases. Some of you may remember the time, and

the operation of medicines, are too slow and uncertain in these cases to detract in the least from the validity of the miracle. He cured Peter's mother-in-law, it is true, of a fever ; but to show that the cure was miraculous, the sacred historian adds (contrary to what is common after a fever) "that she arose *immediately*, and ministered unto them."

* In the city of Bergen, which consists of 30,000 inhabitants, there is but one physician ; who is supported at the expense of the public. Pontoppidan's Nat. Hist. of Norway.

our fathers have told those of us who do not, when the diseases of PENNSYLVANIA were as few and as simple as those of the Indians. The food of the inhabitants was then simple ; their only drink was water ; their appetites were restrained by labour ; religion excluded the influence of sickening passions ; private hospitality supplied the want of a public hospital ; nature was their only nurse, and temperance their principal physician. But I must not dwell upon this retrospect of primæval manners ; and I am too strongly impressed with a hope of a revival of such happy days, to pronounce them the golden age of our province.

Our esteem for the customs of our savage neighbours will be lessened, when we add, that civilization does not preclude the honours of old age. The proportion of old people is much greater among civilized, than among savage nations. It would be easy to decide this assertion in our favour, by appealing to facts in the natural histories of Britain, Norway, Sweden, North-America,* and several of the West-India islands.

* It has been urged against the state of longevity in America, that the Europeans, who settle among us, generally arrive to a greater age than the Americans. This is not occasioned so much by a peculiar firmness in their stamina, as by an increase of vigour which the constitu-

The laws of decency and nature are not necessarily abolished by the customs of civilized nations. In many of these we read of women, among whom nature alone still performs the office of a midwife,* and who feel the obligations of suckling their children to be equally binding with the common obligations of morality.

tion acquires by a change of climate. A Frenchman (*cæteris paribus*) outlives an Englishman in England. A Hollander prolongs his life by removing to the Cape of Good Hope. A Portuguese gains fifteen or twenty years by removing to Brazil. And there are good reasons to believe that a North-American would derive the same advantages, in point of health and longevity, by removing to Europe, which a European derives from coming to this country.

From a calculation made by an ingenious foreigner, it appears, that a greater proportion of old people are to be found in Connecticut, than in any colony in North America. This colony contains 180,000 inhabitants. They have no public hospitals or poor-houses; nor is a beggar to be seen among them. There cannot be more striking proofs than these facts of the simplicity of their manners.

* Parturition, in the simple ages of all countries, is performed by nature. The Israelitish women were delivered even without the help of the Egyptian midwives. We read of but two women who died in child-birth, in the whole history of the Jews. Dr. Bancroft says, that child-bearing

Civilization does not render us less fit for the necessary hardships of war. We read of armies of civilized nations, who have endured degrees of cold, hunger, and fatigue, which have not been exceeded by the savages of any country.*

Civilization does not always multiply the avenues of death. It appears from the bills of mortality, of many countries, that fewer in proportion die among civilized, than among savage nations.

is attended with so little pain in Guiana, that the women seem to be exempted from the curse inflicted upon Eve. These easy births are not confined to warm climates. They are equally safe and easy in Norway and Iceland, according to Pontoppidan and Anderson's histories of those countries.

* Civilized nations have, in the end, always conquered savages as much by their ability to bear hardships, as by their superior military skill. Soldiers are not to be chosen indiscriminately. The greatest generals have looked upon sound constitutions to be as essential to soldiers, as bravery or military discipline. Count Saxe refused soldiers born and bred in large cities ; and sought for such only as were bred in mountainous countries. The king of Prussia calls young soldiers only to the dangers and honours of the field, in his elegant poem, *Sur l'Art de la Guerre*, chant 1. Old soldiers generally lose the advantages of their veteranism, by their habits of idleness and debauchery. An able general, and experienced officers, will always supply the defects of age in young soldiers.

Even the charms of beauty are heightened by civilization. We read of stateliness, proportion, fine teeth,* and complexions, in both sexes, forming the principal outlines of national characters.

The danger of many diseases is not proportioned to their violence, but to their duration. America has advanced but a few paces in luxury and effeminacy. There is yet strength enough in her vitals to give life to those parts which are decayed. She may tread back her steps. For this purpose,

I. Let our children be educated in a manner more agreeable to nature.

* Bad teeth are observed chiefly in middle latitudes, which are subject to alternate heats and colds. The inhabitants of Norway and Russia are as remarkable for their fine teeth as the inhabitants of Africa. We observe fine teeth to be universal likewise among the inhabitants of France, who live in a *variable* climate. These have been ascribed to their protecting their heads from the action of the night air by means of woollen night-caps, and to the extraordinary attention to the teeth of their children. These precautions secure good teeth ; and are absolutely necessary in all variable climates, where people do not adopt all the customs of the savage life.

II. Let the common people (who constitute the wealth and strength of our country) be preserved from the effects of ardent spirits. Had I a double portion of all that eloquence, which has been employed in describing the political evils that lately threatened our country, it would be too little to set forth the numerous and complicated *physical* and *moral* evils, which these liquors have introduced among us. To encounter this *hydra* requires an arm accustomed, like that of Hercules, to vanquish monsters. Sir William Temple tells us, that formerly in Spain no man could be admitted as an evidence in a court, who had once been convicted of drunkenness. I do not call for so severe a law in this country. Let us first try the force of severe manners. Lycurgus governed more by these, than by his laws. “*Boni mores, non bonæ leges,*” according to Tacitus, were the bulwarks of virtue among the ancient Germans.

III. I despair of being able to call the votaries of Bacchus from their bottle, and shall therefore leave them to be roused by the more eloquent twinges of the gout.

IV. Let us be cautious what kind of manufactures we admit among us. The rickets made their first appearance in the manufacturing towns in

England. Dr. Fothergill informed me, that he had often observed, when a pupil, that the greatest part of the chronic patients in the London Hospital were Spittal-field weavers. I would not be understood, from these facts, to discourage those manufactures which employ women and children : these suffer few inconveniences from a sedentary life : nor do I mean to offer the least restraint to those manufactories among men, which admit of free air, and the exercise of all their limbs. Perhaps a pure air, and the abstraction of spirituous liquors, might render sedentary employments less unhealthy in America, even among men, than in the populous towns of Great Britain.

The population of a country is not to be accomplished by rewards and punishments. And it is happy for America, that the universal prevalence of the protestant religion, the checks lately given to negro slavery, the general unwillingness among us to acknowledge the usurpations of primogeniture, the universal practice of inoculation for the small-pox, and the absence of the plague, render the interposition of government for that purpose unnecessary.

These advantages can only be secured to our country by AGRICULTURE. This is the true basis

of national health, riches, and populousness. Nations, like individuals, never rise higher than when they are ignorant whither they are tending. It is impossible to tell, from history, what will be the effects of agriculture, industry, temperance, and commerce, urged on by the competition of colonies united in the same general pursuits, in a country, which, for extent, variety of soil, climate, and number of navigable rivers, has never been equalled in any quarter of the globe. America is the theatre, where human nature will probably receive her last and principal literary, moral, and political honours.

But I recall myself from the ages of futurity. The province of Pennsylvania has already shown, to her sister colonies, the influence of agriculture and commerce upon the number and happiness of a people. It is scarcely a hundred years since our illustrious legislator, with a handful of men, landed upon these shores. Although the perfection of our government, the healthiness of our climate, and the fertility of our soil, seemed to ensure a rapid settlement of the province; yet it would have required a prescience bordering upon divine to have foretold, that in such a short space of time the province would contain above 300,000 inhabitants; and that nearly 30,000 of this number

should compose a city, which should be the third, if not the second, in commerce in the British empire. The pursuits of literature require leisure, and a total recess from clearing forests, planting, building, and all the common toils of settling a new country ; but before these arduous works were accomplished, the SCIENCES, ever fond of the company of liberty and industry, chose this spot for the seat of their empire in this new world. Our COLLEGE, so catholic in its foundation, and extensive in its objects, already sees her sons executing offices in the highest departments of society. I have now the honour of speaking in the presence of a most respectable number of philosophers, physicians, astronomers, botanists, patriots, and legislators ; many of whom have already seized the prizes of honour, which their ancestors had allotted to a much later posterity. Our first offering had scarcely found its way into the temple of fame, when the oldest societies in Europe turned their eyes upon us, expecting with impatience to see the mighty fabric of science, which, like a well-built arch, can only rest upon the whole of its materials, completely finished from the treasures of this unexplored quarter of the globe.

It reflects equal honour upon our society and the honourable assembly of our province, to ac-

knowledge, that we have always found the latter willing to encourage by their patronage, and reward by their liberality, all our schemes for promoting useful knowledge. What may we not expect from this harmony between the sciences and government! Methinks I see canals cut, rivers once impassable rendered navigable, bridges erected, and roads improved, to facilitate the exportation of grain. I see the banks of our rivers vying in fruitfulness with the banks of the river of Egypt. I behold our farmers nobles; our merchants princes. But I forbear—imagination cannot swell with the subject.

I beg leave to conclude, by deriving an argument from our connection with the legislature, to remind my auditors of the duty they owe to the society. Patriotism and literature are here connected together; and a man cannot neglect the one, without being destitute of the other. Nature and our ancestors have completed their works among us; and have left us nothing to do, but to enlarge and perpetuate our own happiness.

AN INQUIRY
INTO THE
INFLUENCE OF PHYSICAL CAUSES
UPON THE MORAL FACULTY.

DELIVERED BEFORE
THE AMERICAN PHILOSOPHICAL SOCIETY,
HELD AT PHILADELPHIA,
ON THE TWENTY-SEVENTH OF FEBRUARY, 1786.

AN INQUIRY, &c.

GENTLEMEN,

IT was for the laudable purpose of exciting a spirit of emulation and inquiry among the members of our body, that the founders of our society instituted an annual oration. The task of preparing, and delivering this exercise, hath devolved, once more, upon me. I have submitted to it, not because I thought myself capable of fulfilling your intentions, but because I wished, by a testimony of my obedience to your requests, to atone for my long absence from the temple of science.

The subject, upon which I am to have the honour of addressing you this evening, is on the influence of physical causes upon the moral faculty.

By the moral faculty I mean a capacity in the human mind of distinguishing and choosing good and evil, or, in other words, virtue and vice. It is a native principle, and though it be capable of improvement by experience and reflection, it is not derived from either of them. St. Paul and Cicero give us the most perfect account of it that is to be found in modern or ancient authors. “For when the Gentiles (says St. Paul) which have not the law, do by nature the things contained in the law, *these*, having not the law, are a *law* unto themselves; which show the works of the law written in their hearts, their consciences also, bearing witness, and their thoughts the mean while accusing, or else excusing, another.”*

The words of Cicero are as follow: “Est igitur hæc, judices, non scripta, sed nata lex, quam non didicimus, accepimus, legimus, verum ex natura ipsa arripuimus, hausimus, expressimus, ad quam non docti, sed facti, non instituti, sed imbuti sumus.”† This faculty is often confounded with conscience, which is a distinct and independent capacity of the mind. This is evident from the passage quoted from the writings of St. Paul, in which conscience is said to be the witness that

* Rom. i. 14, 15.

† Oratio pro Milone.

accuses or excuses us, of a breach of the law written in our hearts. The moral faculty is what the schoolmen call the “*regula regulans* ;” the conscience is their “*regula regulata* ;” or, to speak in more modern terms, the moral faculty performs the office of a law-giver, while the business of conscience is to perform the duty of a judge. The moral faculty is to the conscience, what taste is to the judgment, and sensation to perception. It is quick in its operations, and, like the sensitive plant, acts without reflection, while conscience follows with deliberate steps, and measures all her actions by the unerring square of right and wrong. The moral faculty exercises itself upon the actions of others. It approves, even in books, of the virtues of a Trajan, and disapproves of the vices of a Marius, while conscience confines its operations only to its own actions. These two capacities of the mind are generally in an exact ratio to each other, but they sometimes exist in different degrees in the same person. Hence we often find conscience in its full vigour, with a diminished tone, or total absence of the moral faculty.

It has long been a question among metaphysicians, whether the conscience be seated in the will or in the understanding. The controversy can only be settled by admitting the will to be the seat

of the moral faculty, and the understanding to be the seat of the conscience. The mysterious nature of the union of those two moral principles with the will and understanding is a subject foreign to the business of the present inquiry.

As I consider virtue and vice to consist in *action*, and not in opinion, and as this action has its seat in the *will*, and not in the conscience, I shall confine my inquiries chiefly to the influence of physical causes upon that moral power of the mind, which is connected with volition, although many of these causes act likewise upon the conscience, as I shall show hereafter. The state of the moral faculty is visible in actions, which affect the well-being of society. The state of the conscience is invisible, and therefore removed beyond our investigation.

The moral faculty has received different names from different authors. It is the “moral sense” of Dr. Hutchison; “the sympathy” of Dr. Adam Smith; the “moral instinct” of Rousseau; and “the light that lighteth every man that cometh into the world” of St. John. I have adopted the term of moral faculty from Dr. Beattie, because I conceive it conveys, with the most perspicuity, the idea of a capacity in the mind of choosing good and evil.

Our books of medicine contain many records of the effects of physical causes upon the memory, the imagination, and the judgment. In some instances we behold their operation only on one, in others on two, and, in many cases, upon the whole of these faculties. Their derangement has received different names, according to the number or nature of the faculties that are affected. The loss of memory has been called "amnesia;" false judgment upon one subject has been called "melancholia;" false judgment upon all subjects has been called "mania;" and a defect of all the three intellectual faculties that have been mentioned has received the name of "amentia." Persons who labour under the derangement, or want, of these faculties of the mind, are considered, very properly, as subjects of medicine; and there are many cases upon record, that prove that their diseases have yielded to the healing art.

In order to illustrate the effects of physical causes upon the moral faculty, it will be necessary *first* to show their effects upon the memory, the imagination, and the judgment; and at the same time to point out the analogy between their operation upon the intellectual faculties of the mind and the moral faculty.

1. Do we observe a connection between the intellectual faculties and the degrees of consistency and firmness of the brain in infancy and childhood? The same connection has been observed between the strength, as well as the progress, of the moral faculty in children.

2. Do we observe a certain size of the brain, and a peculiar cast of features, such as the prominent eye, and the aquiline nose, to be connected with extraordinary portions of genius? We observe a similar connection between the figure and temperament of the body and certain moral qualities. Hence we often ascribe good temper and benevolence to corpulency, and irascibility to sanguineous habits. Cæsar thought himself safe in the friendship of the "sleek-headed" Anthony and Dolabella, but was afraid to trust to the professions of the slender Cassius.

3. Do we observe certain degrees of the intellectual faculties to be hereditary in certain families? The same observation has been frequently extended to moral qualities. Hence we often find certain virtues and vices as peculiar to families, through all their degrees of consanguinity and duration, as a peculiarity of voice, complexion, or shape.

4. Do we observe instances of a total want of memory, imagination, and judgment, either from an original defect in the stamina of the brain, or from the influence of physical causes? The same unnatural defect is sometimes observed, and probably from the same causes, of a moral faculty. The celebrated Servin, whose character is drawn by the duke of Sully, in his *Memoirs*, appears to be an instance of the total absence of the moral faculty, while the chasm, produced by this defect, seems to have been filled up by a more than common extension of every other power of his mind. I beg leave to repeat the history of this prodigy of vice and knowledge. "Let the reader represent to himself a man of a genius so lively, and of an understanding so extensive, as rendered him scarce ignorant of any thing that could be known; of so vast and ready a comprehension, that he immediately made himself master of whatever he attempted; and of so prodigious a memory, that he never forgot what he once learned. He possessed all parts of philosophy, and the mathematics, particularly fortification and drawing. Even in theology he was so well skilled, that he was an excellent preacher, whenever he had a mind to exert that talent, and an able disputant for and against the reformed religion, indifferently. He not only understood Greek, He-

brew, and all the languages which we call learned, but also all the different jargons, or modern dialects. He accented and pronounced them so naturally, and so perfectly imitated the gestures and manners both of the several nations of Europe, and the particular provinces of France, that he might have been taken for a native of all, or any, of these countries: and this quality he applied to counterfeit all sorts of persons, wherein he succeeded wonderfully. He was, moreover, the best comedian, and the greatest droll that perhaps ever appeared. He had a genius for poetry, and had wrote many verses. He played upon almost all instruments, was a perfect master of music, and sang most agreeably and justly. He likewise could say mass, for he was of a disposition to do, as well as to know, all things. His body was perfectly well suited to his mind. He was light, nimble, and dexterous, and fit for all exercises. He could ride well, and in dancing, wrestling, and leaping, he was admired. There are not any recreative games that he did not know, and he was skilled in almost all mechanic arts. But now for the reverse of the medal. Here it appeared, that he was treacherous, cruel, cowardly, deceitful, a liar, a cheat, a drunkard, and a glutton, a sharper in play, immersed in every species

of vice, a blasphemer, an atheist. In a word, in him might be found all the vices that are contrary to nature, honour, religion, and society, the truth of which he himself evinced with his latest breath; for he died in the flower of his age, in a common brothel, perfectly corrupted by his debaucheries, and expired with the glass in his hand, cursing and denying God.”*

It was probably a state of the human mind such as has been described, that our Saviour alluded to in the disciple who was about to betray him, when he called him “a devil.” Perhaps the essence of depravity, in infernal spirits, consists in their being wholly devoid of a moral faculty. In them the will has probably lost the power of choosing,† as well as the capacity of enjoying, moral good. It is true, we read of their trembling in a belief of the existence of a God, and of their anticipating future punishment, by asking whether they were to be tormented before their time : but this is

* Vol. iii. p. 216, 217.

† Milton seems to have been of this opinion. Hence, after ascribing repentance to Satan, he makes him declare,

“Farewell remorse : all good to me is lost,

“*Evil, be thou my good.*”——

PARADISE LOST, Book IV.

the effect of conscience, and hence arises another argument in favour of this judicial power of the mind being distinct from the moral faculty. It would seem as if the Supreme Being had preserved the moral faculty in man from the ruins of his fall, on purpose to guide him back again to Paradise, and at the same time had constituted the conscience, both in men and fallen spirits, a kind of royalty in his moral empire, on purpose to show his property in all intelligent creatures, and their original resemblance to himself. Perhaps the essence of moral depravity in man consists in a total, but temporary, suspension of the power of conscience. Persons in this situation are emphatically said in the Scriptures to “be past feeling,” and to have their consciences seared with a “hot iron;” they are likewise said to be “twice dead,” that is, the same torpor, or moral insensibility, has seized both the moral faculty and the conscience.

5. Do we ever observe instances of the existence of only *one* of the three intellectual powers of the mind that have been named, in the absence of the other two? We observe something of the same kind with respect to the moral faculty. I once knew a man, who discovered no one mark of reason, who possessed the moral sense or faculty in so high a degree, that he spent his whole life in acts

of benevolence. He was not only inoffensive (which is not always the case with idiots) but he was kind and affectionate to every body. He had no ideas of time, but what were suggested to him by the returns of the stated periods for public worship, in which he appeared to take great delight. He spent several hours of every day in devotion, in which he was so careful to be private, that he was once found in the most improbable place in the world for that purpose, viz. in an oven.

6. Do we observe the memory, the imagination, and the judgment, to be affected by diseases, particularly by madness? Where is the physician, who has not seen the moral faculty affected from the same causes! How often do we see the temper wholly changed by a fit of sickness! And how often do we hear persons of the most delicate virtue utter speeches, in the delirium of a fever, that are offensive to decency or good manners! I have heard a well-attested history of a clergyman of the most exemplary moral character, who spent the last moments of a fever, which deprived him both of his reason and his life, in profane cursing and swearing. I once attended a young woman in a nervous fever, who discovered, after her recovery, a loss of her former habit of veracity. Her memory (a defect of which might be suspected of

being the cause of this vice) was in every respect as perfect as it was before the attack of the fever.* The instances of immorality in maniacs, who were formerly distinguished for the opposite character, are so numerous, and well known, that it will not be necessary to select any cases, to establish the truth of the proposition contained under this head.

7. Do we observe any of the three intellectual faculties that have been named enlarged by diseases? Patients, in the delirium of a fever, often discover extraordinary flights of imagination, and madmen often astonish us with their wonderful acts of memory. The same enlargement, sometimes, appears in the operations of the moral faculty. I have more than once heard the most sublime discourses of morality in the cell of an hospital, and who has not seen instances of patients in acute diseases discovering degrees of benevolence and integrity, that were not natural to them in the ordinary course of their lives?†

* I have selected this case from many others which have come under my notice, in which the moral faculty appeared to be impaired by diseases, particularly by the typhus of Dr. Cullen, and by those species of palsy which affect the brain.

† Xenophon makes Cyrus declare, in his last moments, "That the soul of man, at the hour of death, appears *most divine*, and then foresees something of future events."

8. Do we ever observe a partial insanity, or false perception on one subject, while the judgment is sound and correct, upon all others? We perceive, in some instances, a similar defect in the moral faculty. There are persons who are moral, in the highest degree, as to certain duties, who nevertheless live under the influence of some one vice. I knew an instance of a woman, who was exemplary in her obedience to every command of the moral law, except one. She could not refrain from stealing. What made this vice the more remarkable was, that she was in easy circumstances, and not addicted to extravagance in any thing. Such was her propensity to this vice, that when she could lay her hands upon nothing more valuable, she would often, at the table of a friend, fill her pockets secretly with bread. As a proof that her judgment was not affected by this defect in her moral faculty, she would both confess and lament her crime, when detected in it.

9. Do we observe the imagination in many instances to be affected with apprehensions of dangers that have no existence? In like manner we observe the moral faculty to discover a sensibility to vice, that is by no means proportioned to its degrees of depravity. How often do we see persons labouring under this morbid sensibility of the mo-

ral faculty refuse to give a direct answer to a plain question, that related perhaps only to the weather, or to the hour of the day, lest they should wound the peace of their minds by telling a falsehood !

10. Do dreams affect the memory, the imagination, and the judgment ? Dreams are nothing but incoherent ideas, occasioned by partial or imperfect sleep. There is a variety in the suspension of the faculties and operations of the mind in this state of the system. In some cases the imagination only is deranged in dreams, in others the memory is affected, and in others the judgment. But there are cases, in which the change that is produced in the state of the brain, by means of sleep, affects the moral faculty likewise ; hence we sometimes dream of doing and saying things, when asleep, which we shudder at, as soon as we awake. This supposed defection from virtue exists frequently in dreams, where the memory and judgment are scarcely impaired. It cannot therefore be ascribed to an absence of the exercises of those two powers of the mind.

11. Do we read, in the accounts of travellers, of men, who, in respect of intellectual capacity and enjoyments, are but a few degrees above brutes ? We read likewise of a similar degradation of our

species, in respect to moral capacity and feeling. Here it will be necessary to remark, that the low degrees of moral perception, that have been discovered in certain African and Russian tribes of men, no more invalidate our proposition of the universal and essential existence of a moral faculty in the human mind, than the low state of their intellects prove, that reason is not natural to man. Their perceptions of good and evil are in an exact proportion to their intellectual faculties. But I will go further, and admit, with Mr. Locke,* that some savage nations are totally devoid of the moral faculty, yet it will by no means follow, that this was the original constitution of their minds. The appetite for certain aliments is uniform among all mankind. Where is the nation and the individual, in their primitive state of health, to whom bread is not agreeable? But if we should find savages, or individuals, whose stomachs have been so disordered by intemperance as to refuse this simple and wholesome article of diet, shall we assert that this was the original constitution of their appetites? By no means. As well might we assert, because savages destroy their beauty by painting and cutting their faces, that the principles of taste do not exist

* Essay concerning the Human Understanding, book I, chap. 3.

naturally in the human mind. It is with virtue as with fire. It exists in the mind, as fire does in certain bodies, in a latent or quiescent state. As collision renders the one sensible, so education renders the other visible. It would be as absurd to maintain, because olives become agreeable to many people from habit, that we have no natural appetites for any other kind of food, as to assert that any part of the human species exist without a moral principle, because in some of them it has wanted causes to excite it into action, or has been perverted by example. There are appetites that are wholly artificial. There are tastes so entirely vitiated, as to perceive beauty in deformity. There are torpid and unnatural passions. Why, under certain unfavorable circumstances, may there not exist also a moral faculty, in a state of sleep, or subject to mistakes?

The only apology I shall make, for presuming to differ from that justly-celebrated oracle,* who first unfolded to us a map of the intellectual world, shall be, that the eagle eye of genius often darts its views beyond the notice of facts, which are accommodated to the slender organs of perception of men, who possess no other talent than that of observation.

* Mr. Locke.

It is not surprising, that Mr. Locke has confounded this moral principle with *reason*, or that lord Shaftsbury has confounded it with *taste*, since all three of these faculties agree in the objects of their approbation, notwithstanding they exist in the mind independently of each other. The favourable influence, which the progress of science and taste has had upon the morals, can be ascribed to nothing else, but to the perfect union that subsists in nature between the dictates of reason, of taste, and of the moral faculty. Why has the spirit of humanity made such rapid progress for some years past in the courts of Europe? It is because kings and their ministers have been taught to *reason* upon philosophical subjects. Why have indecency and profanity been banished from the stage in London and Paris? It is because immorality is an offence against the highly cultivated *taste* of the French and English nations.

It must afford great pleasure to the lovers of virtue, to behold the depth and extent of this moral principle in the human mind. Happily for the human race, the intimations of duty and the road to happiness are not left to the slow operations or doubtful inductions of reason, nor to the precarious decisions of taste. Hence we often find the moral faculty in a state of vigour in persons, in whom

reason and taste exist in a weak, or in an uncultivated state. It is worthy of notice, likewise, that while *second* thoughts are best in matters of judgment, *first* thoughts are always to be preferred in matters that relate to morality. *Second* thoughts, in these cases, are generally parlies between duty and corrupted inclinations. Hence Rousseau has justly said, that “a well regulated moral instinct is the surest guide to happiness.”

It must afford equal pleasure to the lovers of virtue to behold, that our moral conduct and happiness are not committed to the determination of a single legislative power. The conscience, like a wise and faithful legislative council, performs the office of a check upon the moral faculty, and thus prevents the fatal consequences of immoral actions.

An objection, I foresee, will arise to the doctrine of the influence of physical causes upon the moral faculty, from its being supposed to favour the opinion of the *materiality* of the soul. But I do not see that this doctrine obliges us to decide upon the question of the nature of the soul, any more than the facts which prove the influence of physical causes upon the memory, the imagination, or the judgment. I shall, however, remark upon this subject, that the writers in favour of the *im-*

mortality of the soul have done that truth great injury, by connecting it necessarily with its *immateriality*. The immortality of the soul depends upon the *will* of the Deity, and not upon the supposed properties of spirit. Matter is in its own nature as immortal as spirit. It is resolvable by heat and mixture into a variety of forms; but it requires the same Almighty hand to annihilate it, that it did to create it. I know of no arguments to prove the immortality of the soul, but such as are derived from the Christian revelation.* It would be as reasonable to assert that the bason of the ocean is immortal, from the greatness of its capacity to hold water; or that we are to live for ever in this world, because we are afraid of dying; as to maintain the immortality of the soul, from the greatness of its capacity for knowledge and happiness, or from its dread of annihilation.

I remarked, in the beginning of this discourse, that persons who are deprived of the just exercise of memory, imagination, or judgment, were proper subjects of medicine; and that there are many cases upon record which prove, that the diseases from the derangement of these faculties have yielded to the healing art.

* "Life and immortality *are* brought to light *only* through the gospel." 2 Tim. i. 10.

It is perhaps only because the diseases of the moral faculty have not been traced to a connection with physical causes, that medical writers have neglected to give them a place in their systems of nosology, and that so few attempts have been hitherto made to lessen or remove them, by physical as well as rational and moral remedies.

I shall not attempt to derive any support to my opinions, from the analogy of the influence of physical causes upon the temper and conduct of brute animals. The facts which I shall produce in favour of the action of these causes upon morals in the human species, will, I hope, render unnecessary the arguments that might be drawn from that quarter.

I am aware, that in venturing upon this subject I step upon untrodden ground. I feel as Æneas did, when he was about to enter the gates of Aver-nus, but without a sybil to instruct me in the mysteries that are before me. I foresee, that men who have been educated in the mechanical habits of adopting popular or established opinions will revolt at the doctrine I am about to deliver, while men of sense and genius will hear my propositions with candour, and if they do not adopt them, will com-

mend that boldness of inquiry, that prompted me to broach them.

I shall begin with an attempt to supply the defects of nosological writers, by naming the partial or weakened action of the moral faculty, MICRONOMIA. The total absence of this faculty I shall call ANOMIA. By the law, referred to in these new genera of *vesaniæ*, I mean the law of nature written in the human heart, and which I formerly quoted from the writings of St. Paul.

In treating of the effects of physical causes upon the moral faculty, it might help to extend our ideas upon this subject, to reduce virtues and vices to certain species, and to point out the effects of particular species of virtue and vice ; but this would lead us into a field too extensive for the limits of the present inquiry. I shall only hint at a few cases, and have no doubt but the ingenuity of my auditors will supply my silence, by applying the rest.

It is immaterial, whether the physical causes that are to be enumerated act upon the moral faculty through the medium of the senses, the passions, the memory, or the imagination. Their influence is equally certain, whether they act as remote, predisposing, or occasional causes.

1. The effects of CLIMATE upon the moral faculty claim our first attention. Not only individuals, but nations, derive a considerable part of their moral, as well as intellectual character, from the different portions they enjoy of the rays of the sun. Irascibility, levity, timidity, and indolence, tempered with occasional emotions of benevolence, are the moral qualities of the inhabitants of warm climates, while selfishness, tempered with sincerity and integrity, form the moral character of the inhabitants of cold countries. The state of the weather, and the seasons of the year also, have a visible effect upon moral sensibility. The month of November, in Great Britain, rendered gloomy by constant fogs and rains, has been thought to favour the perpetration of the worst species of murder, while the vernal sun, in middle latitudes, has been as generally remarked for producing gentleness and benevolence.

2. The effects of DIET upon the moral faculty are more certain, though less attended to, than the effects of climate. "Fulness of bread," we are told, was one of the predisposing causes of the vices of the cities of the plain. The fasts so often inculcated among the Jews were intended to lessen the incentives to vice; for pride, cruelty, and sensuality, are as much the natural consequences

of luxury, as apoplexies and palsies. But the *quality* as well as the quantity of aliment has an influence upon morals; hence we find the moral diseases that have been mentioned are most frequently the offspring of animal food. The prophet Isaiah seems to have been sensible of this, when he ascribes such salutary effects to a temperate and vegetable diet. “Butter and honey shall he eat,” says he, “*that* he may know to refuse the evil, and to choose the good.” But we have many facts which prove the efficacy of a vegetable diet upon the passions. Dr. Arbuthnot assures us, that he cured several patients of irascible tempers, by nothing but a prescription of this simple and temperate regimen.

3. The effects of CERTAIN DRINKS upon the moral faculty are not less observable, than upon the intellectual powers of the mind. Fermented liquors, of a good quality, and taken in a moderate quantity, are favorable to the virtues of candour, benevolence, and generosity; but when they are taken in excess, or when they are of a bad quality, and taken even in a moderate quantity, they seldom fail of rousing every latent spark of vice into action. The last of these facts is so notorious, that when a man is observed to be ill-natured or quarrelsome in Portugal, after drinking,

it is common in that country to say, that "he has drunken bad wine." While occasional fits of intoxication produce ill-temper in many people, habitual drunkenness (which is generally produced by distilled spirits) never fails to eradicate veracity and integrity from the human mind. Perhaps this may be the reason why the Spaniards, in ancient times, never admitted a man's evidence in a court of justice, who had been convicted of drunkenness. Water is the universal sedative of turbulent passions; it not only promotes a general equanimity of temper, but it composes anger. I have heard several well-attested cases, of a draught of cold water having suddenly composed this violent passion, after the usual remedies of reason had been applied to no purpose.

4. EXTREME HUNGER produces the most unfriendly effects upon moral sensibility. It is immaterial, whether it act by inducing a relaxation of the solids, or an acrimony of the fluids, or by the combined operations of both those physical causes. The Indians in this country whet their appetites for that savage species of war, which is peculiar to them, by the stimulus of hunger; hence, we are told, they always return meagre and emaciated from their military excursions. In civilized life we often behold this sensation to overbalance

the restraints of moral feeling; and perhaps this may be the reason why poverty, which is the most frequent parent of hunger, disposes so generally to theft; for the character of hunger is taken from that vice; it belongs to it "to break through stone walls." So much does this sensation predominate over reason and moral feeling, that Cardinal de Retz suggests to politicians, never to risk a motion in a popular assembly, however wise or just it may be, immediately before dinner. That temper must be uncommonly guarded, which is not disturbed by long abstinence from food. One of the worthiest men I ever knew, who made his breakfast his principal meal, was peevish and disagreeable to his friends and family, from the time he left his bed till he sat down to his morning repast, after which, cheerfulness sparkled in his countenance, and he became the delight of all around him.

5. I hinted formerly, in proving the analogy between the effects of DISEASES upon the intellects and upon the moral faculty, that the latter was frequently impaired by madness. I beg leave to add further upon this head, that not only madness, but the hysteria and hypochondriasis, as well as all those states of the body, whether idiopathic or symptomatic, which are accompanied with pre-

ternatural irritability, sensibility, torpor, stupor, or mobility of the nervous system, dispose to vice, either of the body or of the mind. It is in vain to attack these vices with lectures upon morality. They are only to be cured by medicine, particularly by exercise, the cold bath, and by a cold or warm atmosphere. The young woman, whose case I mentioned formerly, that lost her habit of veracity by a nervous fever, recovered this virtue, as soon as her system recovered its natural tone, from the cold weather which happily succeeded her fever.*

* There is a morbid state of excitability in the body during the convalescence from fever, which is intimately connected with an undue propensity to venereal pleasures. I have met with several instances of it. The marriage of the celebrated Mr. Howard to a woman who was twice as old as himself, and very sickly, has been ascribed, by his biographer, Dr. Aiken, to *gratitude* for her great attention to him in a fit of sickness. I am disposed to ascribe it to a sudden paroxysm of another passion, which, as a religious man, he could not gratify in any other than in a lawful way. I have heard of two young clergymen who married the women who had nursed them in fits of sickness. In both cases there was great inequality in their years, and condition in life. Their motive was, probably, the same as that which I have attributed to Mr. Howard. Dr. Patrick Russel takes notice of an uncommon degree of venereal excitability which followed attacks of the plague at Messina, in 1743, in all ranks

6. IDLENESS is the parent of every vice. It is mentioned in the Old Testament as another of the predisposing causes of the vices of the cities of the plain. LABOUR, of all kinds, favours and facilitates the practice of virtue. The country life is happy, chiefly because its laborious employments are favourable to virtue, and unfriendly to vice. It is a common practice, I have been told, for the planters, in the southern states, to consign a house slave, who has become vicious from idleness, to the drudgery of the field, in order to reform him. The bridewells and workhouses of all civilized countries prove, that labour is not only a very severe, but the most benevolent of all punishments, inasmuch as it is one of the most suitable means of reformation. Mr. Howard tells us, in his History of Prisons, that in Holland it is a common saying, "Make men work, and you will make them honest." And over the rasp and spin-house at Grœningen, this sentiment is expressed (he tells us) by a happy motto :

"Vitiorum semina—otium—labore exhauriendum."

The effects of steady labour in early life, in creating of people. Marriages, he says, were more frequent after it than usual, and virgins were, in some instances, violated, who died of that disease, by persons who had just recovered from it.

virtuous habits, is still more remarkable. The late Anthony Benezet, of this city, whose benevolence was the centinel of the virtue, as well as of the happiness of his country, made it a constant rule, in binding out poor children, to avoid putting them into wealthy families, but always preferred masters for them who worked themselves, and who obliged these children to work in their presence. If the habits of virtue, contracted by means of this apprenticeship to labour, are purely mechanical, their effects are, nevertheless, the same upon the happiness of society, as if they flowed from principle. The mind, moreover, when preserved by these means from weeds, becomes a more mellow soil, afterwards, for moral and rational improvement.

7. The effects of EXCESSIVE SLEEP are intimately connected with the effects of idleness upon the moral faculty : hence we find that moderate, and even scanty portions of sleep, in every part of the world, have been found to be friendly, not only to health and long life, but in many instances to morality. The practice of the monks, who often sleep upon a floor, and who generally rise with the sun, for the sake of mortifying their sensual appetites, is certainly founded in wisdom, and has often produced the most salutary moral effects.

8. The effects of bodily pain upon the moral are not less remarkable than upon the intellectual powers of the mind. The late Dr. Gregory, of the university of Edinburgh, used to tell his pupils, that he always found his perceptions quicker in a fit of the gout, than at any other time. The pangs which attend the dissolution of the body are often accompanied with conceptions and expressions, upon the most ordinary subjects, that discover an uncommon elevation of the intellectual powers. The effects of bodily pain are exactly the same in rousing and directing the moral faculty. Bodily pain, we find, was one of the remedies employed in the Old Testament, for extirpating vice, and promoting virtue: and Mr. Howard tells us, that he saw it employed successfully as a means of reformation, in one of the prisons which he visited. If pain has a physical tendency to cure vice, I submit it to the consideration of parents and legislators, whether moderate degrees of corporal punishments, inflicted for a great length of time, would not be more medicinal in their effects than the violent degrees of them, which are of short duration.

9. Too much cannot be said in favour of CLEANLINESS, as a physical means of promoting virtue. The writings of Moses have been called, by military men, the best "orderly book" in the

world. In every part of them we find cleanliness inculcated with as much zeal, as if it was part of the moral, instead of the Levitical law. Now it is well known, that the principal design of every precept and rite of the ceremonial parts of the Jewish religion was, to prevent vice, and to promote virtue. All writers upon the leprosy take notice of its connection with a certain vice. To this disease gross animal food, particularly swine's flesh, and a dirty skin, have been thought to be predisposing causes: hence the reason, probably, why pork was forbidden, and why ablutions of the body and limbs were so frequently inculcated by the Jewish law. Sir John Pringle's remarks, in his Oration upon captain Cook's voyage, delivered before the Royal Society, in London, are very pertinent to this part of our subject. "Cleanliness (says he) is conducive to health, but is it not obvious that it also tends to good order and other virtues. Such (meaning the ship's crew) as were made more cleanly, became more sober, more orderly, and more attentive to duty." The benefit to be derived by parents and school-masters from attending to these facts is too obvious to be mentioned.

10. I hope I shall be excused in placing SOLITUDE among the physical causes which influence

the moral faculty, when I add, that I confine its effects to persons who are irreclaimable by rational or moral remedies. Mr. Howard informs us, that the chaplain of the prison at Liege, in Germany, assured him, "that the most refractory and turbulent spirits became tractable and submissive, by being closely confined for four or five days." In bodies that are predisposed to vice, the stimulus of cheerful, but much more of profane society and conversation upon the animal spirits becomes an exciting cause, and, like the stroke of the flint upon the steel, renders the sparks of vice both active and visible. By removing men out of the reach of this exciting cause, they are often reformed, especially if they are confined long enough to produce a sufficient chasm in their habits of vice. Where the benefit of reflection and instruction from books can be added to solitude and confinement, their good effects are still more certain. To this philosophers and poets in every age have assented, by describing the life of a hermit as a life of passive virtue.

II. Connected with solitude, as a mechanical means of promoting virtue, SILENCE deserves to be mentioned in this place. The late Dr. Fothergill, in his plan of education for that benevolent institution at Ackworth, which was the last care of his useful life, says every thing that can be said

in favour of this necessary discipline, in the following words : “ To habituate children, from their early infancy, to silence and attention, is of the greatest advantage to them, not only as a preparative to their advancement in religious life, but as the groundwork of a well cultivated understanding. To have the active minds of children put under a kind of restraint ; to be accustomed to turn their attention from external objects, and habituated to a degree of abstracted quiet ; is a matter of great consequence, and lasting benefit to them. Although it cannot be supposed, that young and active minds are always engaged in silence as they ought to be, yet to be accustomed thus to quietness is no small point gained towards fixing a habit of patience, and recollection, which seldom forsakes those, who have been properly instructed in this entrance of the school of wisdom, during the residue of their days.”

For the purpose of acquiring this branch of education, children cannot associate too early nor too often with their parents, or with their superiors in age, rank, and wisdom.

12. The effects of *MUSIC* upon the moral faculty have been felt and recorded in every country,

Hence we are able to discover the virtues and vices of different nations, by their tunes, as certainly as by their laws. The effects of music, when simply mechanical, upon the passions, are powerful and extensive. But it remains yet to determine the degrees of moral ecstasy that may be produced by an attack upon the ear, the reason, and the moral principle, at the same time, by the combined powers of music and eloquence.

13. The ELOQUENCE of the PULPIT is nearly allied to music in its effects upon the moral faculty. It is true, there can be no permanent change in the temper and moral conduct of a man, that is not derived from the understanding and the will; but we must remember, that these two powers of the mind are most assailable, when they are attacked through the avenue of the passions; and these, we know, when agitated by the powers of eloquence, exert a mechanical action upon every power of the soul. Hence we find, in every age and country where christianity has been propagated, the most accomplished orators have generally been the most successful reformers of mankind. There must be a defect of eloquence in a preacher, who, with the resources for oratory which are contained in the Old and New Testaments, does not produce in every man who hears him at least a temporary love of virtue. I grant that the eloquence of the

pulpit alone cannot change men into christians, but it certainly possesses the power of changing brutes into men. Could the eloquence of the stage be properly directed, it is impossible to conceive the extent of its mechanical effects upon morals. The language and imagery of a Shakespeare, upon moral and religious subjects, poured upon the passions and the senses, in all the beauty and variety of dramatic representation ; who could resist, or describe their effects ?

14. ODOURS of various kinds have been observed to act in the most sensible manner upon the moral faculty. Brydone tells us, upon the authority of a celebrated philosopher in Italy, that the peculiar wickedness of the people who live in the neighbourhood of *Ætna* and *Vesuvius* is occasioned chiefly by the smell of the sulphur, and of the hot exhalations which are constantly discharged from those volcanoes. Agreeable odours seldom fail to inspire serenity, and to compose the angry spirits. Hence the pleasure, and one of the advantages, of a flower garden. The smoke of tobacco is likewise of a composing nature, and tends not only to produce what is called a train in perception, but to hush the agitated passions into silence and order. Hence the practice of connecting the pipe or segar and the bottle together, in public company.

15. It will be sufficient only to mention LIGHT and DARKNESS, to suggest facts in favour of the influence of each of them upon moral sensibility. How often do the peevish complaints of the night, in sickness, give way to the composing rays of the light of the morning? Othello cannot murder Desdemona by candle-light, and who has not felt the effects of a blazing fire upon the gentle passions?*

16. It is to be lamented, that no experiments have as yet been made, to determine the effects of all the different species of AIRS, which chemistry has lately discovered, upon the moral faculty. I have authority, from actual experiments, only to declare, that dephlogisticated air, when taken into the lungs, produces cheerfulness, gentleness, and serenity of mind.

17. What shall we say of the effects of MEDICINES upon the moral faculty? That many substances in the materia medica act upon the intellects is well known to physicians. Why should

* The temperature of the air has a considerable influence upon moral feeling. Henry the Third of France was always ill humoured, and sometimes cruel, in cold weather. There is a damp air which comes from the sea in Northumberland county in England which is known by the name of the *Sea-fret*; from its inducing fretfulness in the temper.

it be thought impossible for medicines to act in like manner upon the moral faculty? May not the earth contain, in its bowels, or upon its surface, antidotes? But I will not blend facts with conjectures. Clouds and darkness still hang upon this part of my subject.

Let it not be suspected, from any thing that I have delivered, that I suppose the influence of physical causes upon the moral faculty renders the agency of divine influence unnecessary to our moral happiness. I only maintain, that the operations of the divine government are carried on in the moral, as in the natural world, by the instrumentality of second causes. I have only trodden in the footsteps of the inspired writers; for most of the physical causes I have enumerated are connected with moral precepts, or have been used as the means of reformation from vice, in the Old and New Testaments. To the cases that have been mentioned, I shall only add, that Nebuchadnezzar was cured of his pride, by means of solitude and a vegetable diet. Saul was cured of his evil spirit, by means of David's harp, and St. Paul expressly says, "I keep my body under, and bring it into subjection, lest that by any means, when I have preached to others, I myself should be a cast-away." But I will go one step further, and add, in favour of divine influence upon the moral

principle, that in those extraordinary cases, where bad men are suddenly reformed, without the instrumentality of physical, moral or rational causes, I believe that the organization of those parts of the body, in which the faculties of the mind are seated, undergoes a physical change ;* and hence the expression of a “ new creature,” which is made use of in the scriptures to denote this change, is proper in a literal, as well as a figurative sense. It is probably the beginning of that perfect renovation of the human body, which is predicted by St. Paul in the following words: “ For our conversation is in heaven, from whence we look for the Saviour, who shall change our vile bodies, that they may be fashioned according to his own glorious body.” I shall not pause to defend myself against the charge of enthusiasm in this place ; for the age is at length arrived, so devoutly wished for by Dr. Cheyne, in which men will not be deterred in their researches after truth, by the terror of odious or unpopular names.

* St. Paul was suddenly transformed from a persecutor into a man of a gentle and amiable spirit. The manner in which this change was effected upon his mind, he tells us in the following words: “ Neither circumcision availeth any thing, nor uncircumcision, but a new creature. From henceforth let no man trouble me ; for I bear in *my body* the *marks* of our Lord Jesus.” Galatians vi. 15. 17.

I cannot help remarking under this head, that if the conditions of those parts of the human body which are connected with the human soul influence morals, the same reason may be given for a virtuous education, that has been admitted for teaching music, and the pronunciation of foreign languages, in the early and yielding state of those organs which form the voice and speech. Such is the effect of a moral education, that we often see its fruits in advanced stages of life, after the religious principles which were connected with it have been renounced; just as we perceive the same care in a surgeon in his attendance upon patients, after the sympathy which first produced this care has ceased to operate upon his mind. The boasted morality of the deists is, I believe, in most cases, the offspring of habits, produced originally by the principles and precepts of christianity. Hence appears the wisdom of Solomon's advice, "Train up a child in the way he should go, and when he is old he will not," I had almost said, he cannot, "depart from it."

Thus have I enumerated the principal causes which act mechanically upon morals. If, from the combined action of physical powers that are opposed to each other, the moral faculty should become stationary, or if the virtue or vice produced by

them should form a neutral quality, composed of both of them, I hope it will not call in question the truth of our general propositions. I have only mentioned the effects of physical causes in a simple state.*

It might help to enlarge our ideas upon this subject, to take notice of the influence of the different stages of society, of agriculture and commerce, of soil and situation, of the different degrees of cultivation of taste, and of the intellectual powers, of the different forms of government, and, lastly, of the different professions and occupations of mankind, upon the moral faculty ; but as these act indirectly only, and by the intervention of causes that are unconnected with matter, I conceive they are foreign to the business of the present inquiry. If they should vary the action of the simple physical causes in any degree, I hope it will not call in question the truth of our general propositions, any more than the compound action of physical powers that are opposed to each other. There remain but a few more causes which are of a compound na-

* The doctrine of the influence of physical causes on morals is happily calculated to beget charity towards the failings of our fellow-creatures. Our duty to practise this virtue is enforced by motives drawn from science, as well as from the precepts of christianity.

ture, but they are so nearly related to those which are purely mechanical, that I shall beg leave to trespass upon your patience, by giving them a place in my oration.

The effects of imitation, habit, and association, upon morals would furnish ample matter for investigation. Considering how much the shape, texture, and conditions of the human body influence morals, I submit it to the consideration of the ingenious, whether, in our endeavours to imitate moral examples, some advantage may not be derived, from our copying the features and external manners of the originals. What makes the success of this experiment probable is, that we generally find men, whose faces resemble each other, have the same manners and dispositions. I infer the possibility of success in an attempt to imitate originals in a manner that has been mentioned, from the facility with which domestics acquire a resemblance to their masters and mistresses, not only in manners, but in countenance, in those cases where they are tied to them by respect and affection. Husbands and wives also, where they possess the same species of face, under circumstances of mutual attachment often acquire a resemblance to each other.

From the general detestation in which hypocrisy is held, both by good and bad men, the mechanical effects of habit upon virtue have not been sufficiently explored. There are, I am persuaded, many instances, where virtues have been assumed by accident, or necessity, which have become real from habit, and afterwards derived their nourishment from the heart. Hence the propriety of Hamlet's advice to his mother :

“ Assume a virtue, if you have it not.
That monster, Custom, who all sense doth eat
Of habits evil, is angel yet in this,
That to the use of actions fair and good
He likewise gives a frock or livery,
That aptly is put on. Refrain to-night,
And that shall lend a kind of easiness
To the next abstinence ; the next more easy :
For use can almost change the stamp of nature,
And master even the devil, or throw him out,
With wondrous potency.”

The influence of ASSOCIATION upon morals opens an ample field for inquiry. It is from this principle, that we explain the reformation from theft and drunkenness in servants, which we sometimes see produced by a draught of spirits, in which tartar emetic had been secretly dissolved. The recollection of the pain and sickness excited by the emetic naturally associates itself with the spi-

rits, so as to render them both equally the objects of aversion. It is by calling in this principle only, that we can account for the conduct of Moses, in grinding the golden calf into a powder, and afterwards dissolving it (probably by means of *hepar sulphuris*) in water, and compelling the children of Israel to drink of it, as a punishment for their idolatry. This mixture is bitter and nauseating in the highest degree. An inclination to idolatry, therefore, could not be felt, without being associated with the remembrance of this disagreeable mixture, and of course being rejected, with equal abhorrence. The benefit of corporal punishments, when they are of a short duration, depends in part upon their being connected, by time and place, with the crimes for which they are inflicted. Quick as the thunder follows the lightning, if it were possible, should punishments follow the crimes, and the advantage of association would be more certain, if the spot where they were committed were made the theatre of their expiation. It is from the effects of this association, probably, that the change of place and company, produced by exile and transportation, has so often reclaimed bad men, after moral, rational, and physical means of reformation had been used to no purpose.

AS SENSIBILITY is the avenue to the moral faculty, every thing which tends to diminish it tends also to injure morals. The Romans owed much of their corruption to the sights of the contests of their gladiators, and of criminals, with wild beasts. For these reasons, executions should never be public. Indeed, I believe there are no public punishments of any kind, that do not harden the hearts of spectators, and thereby lessen the natural horror which all crimes at first excite in the human mind.

CRUELTY to brute animals is another means of destroying moral sensibility. The ferocity of savages has been ascribed in part to their peculiar mode of subsistence. Mr. Hogarth points out, in his ingenious prints, the connection between cruelty to brute animals in youth, and murder in manhood. The emperor Domitian prepared his mind, by the amusement of killing flies, for all those bloody crimes which afterwards disgraced his reign. I am so perfectly satisfied of the truth of a connection between morals and humanity to brutes, that I shall find it difficult to restrain my idolatry for that legislature, that shall first establish a system of laws to defend them from outrage and oppression.

In order to preserve the vigour of the moral faculty, it is of the utmost consequence to keep young people as ignorant as possible of those crimes that are generally thought most disgraceful to human nature. Suicide, I believe, is often propagated by means of newspapers. For this reason, I should be glad to see the proceedings of our courts kept from the public eye, when they expose or punish monstrous vices.

The last mechanical method of promoting morality that I shall mention, is to keep sensibility alive, by a familiarity with scenes of distress from poverty and disease. Compassion never awakens in the human bosom, without being accompanied by a train of sister virtues. Hence the wise man justly remarks, that "By the sadness of the countenance, the heart is made better."

A late French writer, in his prediction of events that are to happen in the year 4000, says, "That mankind in that æra shall be so far improved by religion and government, that the sick and the dying shall no longer be thrown, together with the dead, into splendid houses, but shall be relieved and protected in a connection with their families and society." For the honour of huma-

nity, an institution,* destined for that distant period, has lately been founded in this city, that shall perpetuate the year 1786 in the history of Pennsylvania. Here the feeling heart, the tearful eye, and the charitable hand, may always be connected together, and the flame of sympathy, instead of being extinguished in taxes, or expiring in a solitary blaze by a single contribution, may be kept alive by constant exercise. There is a necessary connection between animal sympathy and good morals. The priest and the Levite, in the New Testament, would probably have relieved the poor man who fell among thieves, had accident brought them near enough to his wounds. The unfortunate Mrs. Bellamy was rescued from the dreadful purpose of drowning herself, by nothing but the distress of a child, rending the air with its cries for bread. It is probably owing, in some measure, to the connection between good morals and sympathy, that the fair sex, in every age and country, have been more distinguished for virtue than men; for how seldom do we hear of a woman devoid of humanity?

Lastly, **ATTRACTION**, **COMPOSITION**, and **DECOMPOSITION**, belong to the passions as well as

* A public dispensary.

to matter. Vices of the same species attract each other with the most force : hence the bad consequences of crowding young men, whose propensities are generally the same, under one roof, in our modern plans of education. The effects of composition and decomposition upon vices appear, in the meanness of the school-boy being often cured by the prodigality of a military life, and by the precipitation of avarice, which is often produced by ambition and love.

If physical causes influence morals in the manner we have described, may they not also influence religious principles and opinions? I answer in the affirmative ; and I have authority, from the records of physic, as well as from my own observations, to declare, that religious melancholy and madness, in all their variety of species, yield with more facility to medicine, than simply to polemical discourses, or to casuistical advice. But this subject is foreign to the business of the present inquiry.

From a review of our subject, we are led to contemplate, with admiration, the curious structure of the human mind. How distinct are the number, and yet how united ! How subordinate, and yet how co-equal, are all its faculties ! How won-

derful is the action of the mind upon the body ! of the body upon the mind ! and of the Divine Spirit upon both ! What a mystery is the mind of man to itself ! — O ! Nature ! — or, to speak more properly, O ! THOU GOD OF NATURE ! in vain do we attempt to scan THY immensity, or to comprehend THY various modes of existence, when a single particle of light, issued from THYSELF, and kindled into intelligence in the bosom of man, thus dazzles and confounds our understandings !

The extent of the moral powers and habits in man is unknown. It is not improbable but the human mind contains principles of virtue, which have never yet been excited into action. We behold with surprise the versatility of the human body in the exploits of tumblers and rope dancers. Even the agility of a wild beast has been demonstrated in a girl of France, and an amphibious nature has been discovered in the human species in a young man in Spain. We listen with astonishment to the accounts of the *memories* of Mithridates, Cyrus, and Servin. We feel a veneration, bordering upon divine homage, in contemplating the stupendous *understandings* of lord Verulam and sir Isaac Newton ; and our eyes grow dim, in attempting to pursue Shakespeare and Milton in their immeasurable flights of *imagination*. And if

the history of mankind does not furnish similar instances of the versatility and perfection of our species in virtue, it is because the moral faculty has been the subject of less culture and fewer experiments than the body, and the intellectual powers of the mind. From what has been said, the reason of this is obvious. Hitherto the cultivation of the moral faculty has been the business of parents, schoolmasters, and divines.* But if the principles, we have laid down, be just, the improvement and extension of this principle should be equally the business of the legislator, the natural philosopher, and the physician; and a physical regimen should as necessarily accompany a moral precept, as directions with respect to the air, exercise, and diet, generally accompany prescriptions for the consumption, and the gout. To encourage us to undertake experiments for the

* The people commonly called Quakers, and the Methodists, make use of the greatest number of physical remedies in their religious and moral discipline, of any sects of Christians; and hence we find them every where distinguished for their good morals. There are several excellent *physical* institutions in other churches; and if they do not produce the same moral effects that we observe from physical institutions among those two modern sects, it must be ascribed to their being more neglected by the members of those churches.

improvement of morals, let us recollect the success of philosophy in lessening the number, and mitigating the violence of incurable diseases. The intermitting fever, which proved fatal to two of the monarchs of Britain, is now under absolute subjection to medicine. Continual fevers are much less fatal than formerly. The small-pox is disarmed of its mortality by inoculation, and even the tetanus and the cancer have lately received a check in their ravages upon mankind. But medicine has done more. It has penetrated the deep and gloomy abyss of death, and acquired fresh honours in his cold embraces. Witness the many hundred people who have lately been brought back to life by the successful efforts of the humane societies, which are now established in many parts of Europe, and in some parts of America. Should the same industry and ingenuity, which have produced these triumphs of medicine over diseases and death, be applied to the moral science, it is highly probable that most of those baneful vices, which deform the human breast, and convulse the nations of the earth, might be banished from the world. I am not so sanguine as to suppose, that it is possible for man to acquire so much perfection from science, religion, liberty, and good government, as to cease to be mortal; but I am fully persuaded, that from the combined action of causes,

which operate at once upon the reason, the moral faculty, the passions, the senses, the brain, the nerves, the blood, and the heart, it is possible to produce such a change in his moral character, as shall raise him to a resemblance of angels; nay, more, to the likeness of God himself. The state of Pennsylvania still deplores the loss of a man, in whom not only reason and revelation, but many of the physical causes that have been enumerated, concurred to produce such attainments in moral excellency, as have seldom appeared in a human being. This amiable citizen considered his fellow-creature, man, as God's extract, from his own works; and whether this image of himself was cut out from ebony or copper; whether he spoke his own, or a foreign language; or whether he worshipped his Maker with ceremonies, or without them, he still considered him as a brother, and equally the object of his benevolence. Poets and historians, who are to live hereafter, to you I commit his panegyric; and when you hear of a law for abolishing slavery in each of the American states, such as was passed in Pennsylvania in the year 1780; when you hear of the kings and queens of Europe publishing edicts for abolishing the trade in human souls; and, lastly, when you hear of schools and churches, with all the arts of civilized life, being established among the nations of Africa,

then remember and record, that this revolution in favour of human happiness was the effect of the labours, the publications, the private letters, and the prayers, of ANTHONY BENEZET.*

I return from this digression, to address myself in a particular manner to you, VENERABLE

* This worthy man was descended from an ancient and honourable family that flourished in the court of Louis XIV. With liberal prospects in life, he early devoted himself to teaching an English school ; in which, for industry, capacity, and attention to the morals and principles of the youth committed to his care, he was without an equal. He published many excellent tracts against the African trade, against war, and the use of spirituous liquors, and one in favour of civilizing and christianizing the Indians. He wrote to the queen of Great Britain, and the queen of Portugal, to use their influence in their respective courts to abolish the African trade. He also wrote an affectionate letter to the king of Prussia, to dissuade him from making war. The history of his life affords a remarkable instance, how much it is possible for an individual to accomplish in the world ; and that the most humble stations do not preclude good men from the most extensive usefulness. He bequeathed his estate (after the death of his widow) to the support of a school for the education of negro children, which he had founded and taught for several years before he died. He departed this life in May, 1784, in the seventy-first year of his age, in the meridian of his usefulness, universally lamented by persons of all ranks and denominations.

SAGES and FELLOW CITIZENS in the REPUBLIC OF LETTERS. The influence of philosophy, we have been told, has already been felt in courts. To increase, and complete, this influence, there is nothing more necessary, than for the numerous literary societies in Europe and America to add the SCIENCE OF MORALS to their experiments and inquiries. The godlike scheme of Henry IV. of France, and of the illustrious queen Elizabeth, of England, for establishing a perpetual peace in Europe, may be accomplished without a system of jurisprudence, by a confederation of learned men and learned societies. It is in their power, by multiplying the objects of human reason, to bring the monarchs and rulers of the world under their subjection, and thereby to extirpate war, slavery, and capital punishments, from the list of human evils. Let it not be suspected that I detract, by this declaration, from the honour of the Christian religion. It is true, Christianity was propagated without the aid of human learning ; but this was one of those miracles, which was necessary to establish it, and which, by repetition, would cease to be a miracle. They misrepresent the Christian religion, who suppose it to be wholly an internal revelation, and addressed only to the moral faculties of the mind. The truths of Christianity afford the greatest scope for the human understanding, and they will become

intelligible to us, only in proportion as the human genius is stretched, by means of philosophy, to its utmost dimensions. Errors may be opposed to errors; but truths, upon all subjects, mutually support each other. And perhaps one reason why some parts of the Christian revelation are still involved in obscurity, may be occasioned by our imperfect knowledge of the phenomena and laws of nature. The truths of philosophy and Christianity dwell alike in the mind of the Deity, and reason and religion are equally the offspring of his goodness. They must, therefore, stand and fall together. By reason, in the present instance, I mean the power of judging of truth, as well as the power of comprehending it. Happy æra! when the divine and the philosopher shall embrace each other, and unite their labours for the reformation and happiness of mankind!

ILLUSTRIOUS COUNSELLORS and SENATORS of Pennsylvania*! I anticipate your candid reception of this feeble effort to increase the quantity of virtue in our republic. It is not my business to

* The president and supreme executive council, and the members of the general assembly of Pennsylvania, attended the delivery of the oration, in the hall of the university, by invitation from the Philosophical Society.

remind you of the immense resources for greatness, [which nature and Providence have bestowed upon our state. Every advantage which France has derived from being placed in the centre of Europe, and which Britain has derived from her mixture of nations, Pennsylvania has opened to her. But my business, at present, is to suggest the means of promoting the happiness, not the greatness, of the state. For this purpose, it is absolutely necessary that our government, which unites into one all the minds of the state, should possess, in an eminent degree, not only the understanding, the passions, and the will, but, above all, the moral faculty and the conscience of an individual. Nothing can be politically right, that is morally wrong; and no necessity can ever sanctify a law, that is contrary to equity. VIRTUE is the soul of a republic. To promote this, laws for the suppression of vice and immorality will be as ineffectual, as the increase and enlargement of jails. There is but one method of preventing crimes, and of rendering a republican form of government durable, and that is, by disseminating the seeds of virtue and knowledge through every part of the state, by means of proper modes and places of education, and this can be done effectually only by the interference and aid of the legislature. I am so deeply impressed with the truth of this opinion,

that were this evening to be the last of my life, I would not only say to the asylum of my ancestors, and my beloved native country, with the patriot of Venice, "Esto perpetua," but I would add, as the last proof of my affection for her, my parting advice to the guardians of her liberties, "To establish and support PUBLIC SCHOOLS in every part of the state."

AN ACCOUNT
OF THE
INFLUENCE OF THE MILITARY AND POLITICAL EVENTS
OF THE
AMERICAN REVOLUTION
UPON
THE HUMAN BODY.

AN ACCOUNT, &c.

THERE were several circumstances peculiar to the American revolution, which should be mentioned previously to an account of the influence of the events which accompanied it upon the human body.

1. The revolution interested every inhabitant of the country of both sexes, and of every rank and age that was capable of reflection. An indifferent, or neutral, spectator of the controversy was scarcely to be found in any of the states.

2. The scenes of war and government which it introduced were new to the greatest part of the inhabitants of the United States, and operated with all the force of *novelty* upon the human mind.

3. The controversy was conceived to be the most important of any that had ever engaged the attention of mankind. It was generally believed, by the friends of the revolution, that the very existence of *freedom*, upon our globe, was involved in the issue of the contest in favour of the United States.

4. The American revolution included in it the cares of government, as well as the toils and dangers of war. The American mind was, therefore, frequently occupied, at the *same time*, by the difficult and complicated duties of political and military life.

5. The revolution was conducted by men who had been born *free*, and whose sense of the blessings of liberty was of course more exquisite than if they had just emerged from a state of slavery.

6. The greatest part of the soldiers in the armies of the United States had family connections and property in the country.

7. The war was carried on by the Americans against a nation, to whom they had long been tied by the numerous obligations of consanguinity, laws, religion, commerce, language, interest, and a mu-

tual sense of national glory. The resentments of the Americans of course rose, as is usual in all disputes, in proportion to the number and force of these ancient bonds of affection and union.

8. A predilection to a limited monarchy, as an essential part of a free and safe government, and an attachment to the reigning king of Great Britain (with a very few exceptions) were universal in every part of the United States.

9. There was at one time a sudden dissolution of civil government in *all*, and of ecclesiastical establishments in several, of the states.

10. The expences of the war were supported by means of a paper currency, which was continually depreciating.

From the action of each of these causes, and frequently from their combination in the same persons, effects might reasonably be expected, both upon the mind and body, which have seldom occurred; or if they have, I believe were never fully recorded in any age or country.

It might afford some useful instruction, to point out the influence of the military and political events

of the revolution upon the understandings, passions, and morals of the citizens of the United States ; but my business in the present inquiry is only to take notice of the influence of those events upon the human body, through the medium of the mind.

I shall first mention the effects of the military, and, secondly, of the political events of the revolution. The last must be considered in a two-fold view, accordingly as they affected the friends, or the enemies, of the revolution.

I. In treating of the effects of the military events, I shall take notice, first, of the influence of *actual* war, and, secondly, of the influence of the military life.

In the beginning of a battle, I have observed *thirst* to be a very common sensation among both officers and soldiers. It occurred where no exercise, or action of the body, could have excited it.

Many officers have informed me, that after the first onset in a battle they felt a glow of heat, so universal as to be perceptible in both their ears. This was the case, in a particular manner, in the battle of Princeton, on the third of January, in the

year 1777, on which day the weather was remarkably cold.

A veteran colonel of a New England regiment, whom I visited at Princeton, and who was wounded in the hand at the battle of Monmouth, on the 28th of June, 1778 (a day in which the mercury stood at 90° of Fahrenheit's thermometer) after describing his situation at the time he received his wound, concluded his story by remarking, that fighting was hot work on a cold day, but much more so on a warm day." The many instances which appeared after that memorable battle, of soldiers who were found among the slain without any marks of wounds or violence upon their bodies, were probably occasioned by the heat excited in the body, by the emotions of the mind, being added to that of the atmosphere.

Soldiers bore operations of every kind, immediately *after* a battle, with much more fortitude than they did at *any time* afterwards.

The effects of the military life upon the human body come next to be considered under this head.

In another place I have mentioned three cases

of pulmonary consumption being perfectly cured by the diet and hardships of a camp life.

Doctor Blane, in his valuable observations on the diseases incident to seamen, ascribes the extraordinary healthiness of the British fleet in the month of April, 1782, to the effects produced on the spirit of the soldiers and seamen, by the victory obtained over the French fleet on the 12th of that month; and relates, upon the authority of Mr. Ives, an instance, in the war between Great-Britain and the combined powers of France and Spain, in 1744, in which the scurvy, as well as other diseases, were checked by the prospect of a naval engagement.

The American army furnished an instance of the effects of victory upon the human mind, which may serve to establish the inferences from the facts related by Doctor Blane. The Philadelphia militia who joined the remains of General Washington's army, in December, 1776, and shared with them a few days afterwards in the capture of a large body of Hessians at Trenton, consisted of 1500 men, most of whom had been accustomed to the habits of a city life. These men slept in tents and barns, and sometimes in the open air, during the usual colds of December and January;

and yet there were but two instances of sickness, and only one of death, in that body of men in the course of nearly six weeks, in those winter months. This extraordinary healthiness of so great a number of men, under such trying circumstances, can only be ascribed to the vigour infused into the human body by the victory of Trenton having produced insensibility to all the usual remote causes of diseases.

Militia officers and soldiers, who enjoyed good health during a campaign, were often affected by fevers and other diseases, as soon as they returned to their respective homes. I knew one instance of a militia captain, who was seized with convulsions the first night he lay on a feather bed, after sleeping several months on a mattress, or upon the ground. These affections of the body appeared to be produced only by the sudden abstraction of that tone in the system, which was excited by a sense of danger, and the other 'invigorating objects of a military life.

THE NOSTALGIA of Doctor Cullen, or the *home-sickness*, was a frequent disease in the American army, more especially among the soldiers of the New England states. But this disease was suspended by the superior action of the mind, un-

der the influence of the principles which governed common soldiers in the American army. Of this General Gates furnished me with a remarkable instance in 1776, soon after his return from the command of a large body of regular troops and militia at Ticonderoga. From the effects of the nostalgia, and the feebleness of the discipline which was exercised over the militia, desertions were very frequent and numerous in his army, in the latter part of the campaign; and yet during the *three weeks* in which the general expected every hour an attack to be made upon him by General Burgoyne, there was not a single desertion from his army, which consisted at that time of 10,000 men.

The patience, firmness and magnanimity, with which the officers and soldiers of the American army endured the complicated evils of hunger, cold and nakedness, can only be ascribed to an insensibility of body produced by an uncommon tone of mind, excited by the love of liberty and their country.

Before I proceed to the second general division of this subject, I shall take notice, that more instances of apoplexies occurred in the city of Philadelphia, in the winter of 1774-5, than had been

known in former years. I should have hesitated in recording this fact, had I not found the observation supported by a fact of the same kind, and produced by a nearly similar cause, in the appendix to the practical works of Doctor Baglivi, professor of physic and anatomy at Rome. After a very wet season in the winter of 1694-5, he informs us, that “apoplexies displayed their rage; and perhaps (adds our author) some part of this epidemic illness was owing to the universal grief and domestic care, occasioned by all Europe being engaged in a war. All commerce was disturbed, and all the avenues of peace blocked up, so that the strongest heart could scarcely bear the thoughts of it.” The winter of 1774-5 was a period of uncommon anxiety among the citizens of America. Every countenance wore the marks of painful solicitude for the event of a petition to the throne of Britain, which was to determine whether reconciliation, or a civil war, with all its terrible and distressing consequences, were to take place. The apoplectic fit, which deprived the world of the talents and virtues of Peyton Randolph, while he filled the chair of congress, in 1775, appeared to be occasioned in part by the pressure of the uncertainty of those great events upon his mind. To the name of this illustrious patriot, several others might be added, who were affected

by the apoplexy in the same memorable year. At this time a difference of opinion upon the subject of the contest with Great Britain had scarcely taken place among the citizens of America.

II. The political events of the revolution produced different effects upon the human body, through the medium of the mind, according as they acted upon the friends or enemies of the revolution.

I shall first describe its effects upon the former class of citizens of the United States.

Many persons, of infirm and delicate habits, were restored to perfect health, by the change of place, or occupation, to which the war exposed them. This was the case in a more especial manner with hysterical women, who were much interested in the successful issue of the contest. The same effects of a civil war upon the hysteria, were observed by Doctor Cullen in Scotland, in the years 1745 and 1746. It may perhaps help to extend our ideas of the influence of the passions upon diseases, to add, that when either love, jealousy, grief, or even devotion, wholly engross the female mind, they seldom fail, in like manner, to cure or to suspenp hysterical complaints.

An uncommon cheerfulness prevailed every where, among the friends of the revolution. Defeats, and even the loss of relations and property, were soon forgotten in the great objects of the war.

The population in the United States was more rapid from births during the war, than it had ever been in the same number of years since the settlement of the country.

I am disposed to ascribe this increase of births *chiefly* to the quantity and extensive circulation of money, and to the facility of procuring the means of subsistence during the war, which favoured marriages among the labouring part of the people.* But I have sufficient documents to prove, that marriages were more fruitful than in former years, and that a considerable number of unfruitful marriages became fruitful during the war. In 1783, the year of the peace, there were several

* Wheat, which was sold before the war for seven shillings and six pence, was sold for several years *during* the war for four, and in some places for two and six pence Pennsylvania currency per bushel. Beggars of every description disappeared in the year 1776, and were seldom seen till near the close of the war.

children born of parents who had lived many years together without issue.

Mr. Hume informs us, in his History of England, that some old people, upon hearing the news of the restoration of Charles II. died suddenly of joy. There was a time when I doubted the truth of this assertion ; but I am now disposed to believe it, from having heard of a similar effect from an agreeable political event, in the course of the American revolution. The door-keeper of congress, an aged man, died suddenly, immediately after hearing of the capture of lord Cornwallis's army. His death was universally ascribed to a violent emotion of political joy. This species of joy appears to be one of the strongest emotions that can agitate the human mind.

Perhaps the influence of that ardour in trade and speculation, which seized many of the friends of the revolution, and which was excited by the fallacious nominal amount of the paper money, should rather be considered as a disease, than as a passion. It unhinged the judgment, deposed the moral faculty, and filled the imagination, in many people, with airy and impracticable schemes of wealth and grandeur. Desultory manners, and a peculiar species of extempore conduct, were among

its characteristic symptoms. It produce dinsensibility to cold, hunger, and danger. The trading towns, and in some instances the extremities of the United States, were frequently visited in a few hours or days by persons affected by this disease ; and hence “to travel with the speed of a speculator,” became a common saying in many parts of the country. This species of insanity (if I may be allowed to call it by that name) did not require the confinement of a bedlam to cure it, like the South-Sea madness described by Doctor Mead. Its remedies were the depreciation of the paper money, and the events of the peace.

The political events of the revolution produced upon its enemies very different effects from those which have been mentioned.

The hypochondriasis of Doctor Cullen occurred, in many instances, in persons of this description. In some of them, the terror and distress of the revolution brought on a true melancholia.* The causes which produced these diseases may be reduced to four heads. 1. The loss of former power or influence in government. 2. The destruction of the hierarchy of the English church in

* *Insania partialis sine dyspepsia*, of Doctor Cullen.

America. 3. The change in the habits of diet, and company, and manners, produced by the annihilation of just debts by means of depreciated paper money. And 4. The neglect, insults, and oppression, to which the loyalists were exposed, from individuals, and, in several instances, from the laws of some of the states.

It was observed in South Carolina, that several gentlemen, who had protected their estates by swearing allegiance to the British government, died soon after the evacuation of Charleston by the British army. Their deaths were ascribed to the neglect with which they were treated by their ancient friends, who had adhered to the government of the United States. The disease was called, by the common people, the *protection fever*.

From the causes which produced this hypochondriasis, I have taken the liberty of distinguishing it by the name of *revolutiana*.

In some cases, this disease was rendered fatal by exile and confinement; and, in others, by those persons who were afflicted with it seeking relief from spirituous liquors.

The termination of the war by the peace in 1783 did not terminate the American revolution. The minds of the citizens of the United States were wholly unprepared for their new situation. The excess of the passion for liberty, inflamed by the successful issue of the war, produced, in many people, opinions and conduct, which could not be removed by reason nor restrained by government. For a while, they threatened to render abortive the goodness of Heaven to the United States, in delivering them from the evils of slavery and war. The extensive influence which these opinions had upon the understandings, passions, and morals of many of the citizens of the United States, constituted a form of insanity, which I shall take the liberty of distinguishing by the name of *anarchia*.

I hope no offence will be given by the freedom of any of these remarks. An inquirer after philosophical truth should consider the passions of men in the same light that he does the laws of matter or motion. The friends and enemies of the American revolution must have been more, or less, than men, if they could have sustained the magnitude and rapidity of the events that characterised it, without discovering some marks of human weakness, both in body and mind. Perhaps these weaknesses were permitted, that human nature might

receive fresh honours in America, by the contending parties (whether produced by the controversies about independence or the national government) mutually forgiving each other, and uniting in plans of general order and happiness.

AN INQUIRY
INTO THE
RELATION OF TASTES AND ALIMENTS
TO EACH OTHER,
AND INTO
THE INFLUENCE OF THIS RELATION
UPON
HEALTH AND PLEASURE.

AN INQUIRY, &c.

IN entering upon this subject, I feel like the clown, who, after several unsuccessful attempts to play upon a violin, threw it hastily from him, exclaiming at the same time, that “there was music in it,” but that he could not bring it out.

I shall endeavour, by a few brief remarks, to lay a foundation for more successful inquiries upon this difficult subject.

Attraction and repulsion seem to be the active principles of the universe. They pervade not only the greatest, but the minutest, works of nature. Salts, earths, inflammable bodies, metals, and vegetables, have all their respective relations to each other. The order of these relations is so uniform, that it has been ascribed by some philosophers to

a latent principle of intelligence pervading each of them.

Colours, odours, and sounds, have likewise their respective relations to each other. They become agreeable and disagreeable, only in proportion to the natural or unnatural combination which takes place between each of their different species.

It is remarkable, that the number of original colours and notes in music is exactly the same. All the variety in both proceeds from the difference of combination. An arbitrary combination of them is by no means productive of pleasure. The relation which every colour and sound bear to each other, was as immutably established at the creation, as the order of the heavenly bodies, or as the relation of the objects of chemistry to each other.

But this relation is not confined to colours and sounds alone. It probably extends to the objects of human aliment. For example, bread and meat, meat and salt, the alkalescent meats and acescent vegetables, all harmonize with each other upon the tongue ; while fish and flesh, butter and raw onions, fish and milk, when combined, are all offensive to a pure and healthy taste.

It would be agreeable to trace the analogy of sounds and tastes. They have both their flats and their sharps. They are both improved by the contrast of discords. Thus pepper, and other condiments (which are disagreeable when taken by themselves) enhance the relish of many of our aliments, and they are both delightful in proportion as they are simple in their composition. To illustrate this analogy by more examples from music would lead us from the subject of the present inquiry.

It is observable that the tongue and the stomach, like instinct and reason, are, by nature, in unison with each other. One of those organs must always be disordered, when they disagree in a single article of aliment. When they both unite in articles of diet that were originally disagreeable, it is owing to a perversion in each of them, similar to that which takes place in the human mind, when both the moral faculty and the conscience lose their natural sensibility to virtue and vice.

Unfortunately for this part of science, the taste and the stomach are so much perverted in infancy and childhood by heterogeneous aliment, that it is difficult to tell what kinds and mixtures of food are natural, and what are artificial. It is true, the system possesses a power of accommodating itself

both to artificial food, and to the most discordant mixtures of that which is natural; but may we not reasonably suppose, that the system would preserve its natural strength and order much longer, if no such violence had been offered to it?

If the relation of aliments to each other follows the analogy of the objects of chemistry, then their union will be influenced by many external circumstances, such as heat and cold, dilution, concentration, rest, motion, and the addition of substances which promote unnatural, or destroy natural mixtures. This idea enlarges the field of inquiry before us, and leads us still further from facts and certainty upon this subject, but at the same time it does not preclude us from the hope of obtaining both; for every difficulty that arises out of this view of the subject may be removed by observation and experiment.

I come now to apply these remarks to health and pleasure. I shall select only a few cases for this purpose; for if my principles be true, my readers cannot avoid discovering many other illustrations of them.

1. When an article of diet is grateful to the taste, and afterwards disagrees with the stomach,

may it not be occasioned by some other kind of food, or by some drink being taken into the stomach, which refuses to unite with the offending article of diet?

2. May not the uneasiness which many persons feel, after a moderate meal, arise from its having consisted of articles of aliment which were not related to each other?

3. May not the delicacy of stomach which sometimes occurs after the fortieth or forty-fifth year of human life be occasioned by nature recovering her empire in the stomach, so as to require simplicity in diet, or such articles only of aliment as are related? May not this be the reason why most people, who have passed those periods of life, are unable to retain or to digest fish and flesh at the same time, and why they generally dine only upon one kind of food?

4. Is not the language of nature in favour of simplicity in diet discovered, by the avidity with which the luxurious and intemperate often seek relief from variety and satiety, by retreating to spring water for drink, and to bread and milk for aliment?

5. May not the reason why plentiful meals of fish, venison, oysters, beef, or mutton, when eaten alone, lie so easily in the stomach, and digest so speedily, be occasioned by no other food being taken with them? A pound, and even more, of the above articles, frequently oppress the system much less than half the quantity of heterogeneous aliments.

6. Does not the facility with which a due mixture of vegetable and animal food digests in the stomach indicate the certainty of their relation to each other?

7. May not the peculiar good effects of a diet wholly vegetable, or animal, be occasioned by the more frequent and intimate relation of the articles of the same kingdoms to each other? And may not this be the reason why so few inconveniences are felt from the mixture of a variety of vegetables in the stomach?

8. May not the numerous acute and chronic diseases of the rich and luxurious arise from heterogeneous aliments being distributed in a *diffused*, instead of a *mixed* state, through every part of the body.

9. May not the many cures which are ascribed to certain articles of diet be occasioned more by their being taken alone, than to any medicinal quality inherent in them? A diet of oysters in one instance, of strawberries in another, and of sugar of roses in many instances, has cured violent and dangerous diseases of the breast.* Grapes, according to Doctor Moore, when eaten in large quantities, have produced the same salutary effect. A milk diet, persisted in for several years, has cured the gout and epilepsy. I have seen many cases of dyspepsia cured by a simple diet of beef and mutton, and have heard of a well-attested case of a diet of veal alone having removed the same disease. Squashes, and turnips likewise, when taken by themselves, have cured that distressing complaint in the stomach. It has been removed even by milk, when taken by itself in a moderate quantity.† The further the body, and more especially the stomach, recede from health, the more this simplicity of diet becomes necessary. The appetite in these cases does not speak the language of uncorrupted nature. It frequently calls for va-

* Vansweiten, 1209. 3.

† Medical Observations and Inquiries, vol. vi. p. 316, 319.

rious and improper aliment ; but this is the effect of intemperance having produced an early breach between the taste and the stomach.

Perhaps the extraordinary cures of obstinate diseases, which are sometimes performed by persons not regularly educated in physic, may be occasioned by a long and steady perseverance in the use of a single article of the *materia medica*. Those chemical medicines which decompose each other, are not the only substances which defeat the intention of the prescriber. Galenical medicines, by combination, I believe, frequently produce effects that are of a compound and contrary nature to their original and simple qualities. This remark is capable of extensive application, but I quit it as a digression from the subject of this inquiry.

10. I wish it to be observed, that I have condemned the mixture of different aliments in the stomach only in a few cases, and under certain circumstances. It remains yet to determine by experiments, what changes are produced upon aliments by heat, dilution, addition, concentration, motion, rest, and the addition of uniting substances, before we can decide upon the relation of aliments to each other, and the influence of that relation upon health. The *olla podrida* of Spain is said

to be a pleasant and wholesome dish. It is probably rendered so, by a previous tendency of all its ingredients to putrefaction, or by means of heat producing a new arrangement, or additional new relations of all its parts. I suspect heat to be a powerful agent in disposing heterogeneous aliments to unite with each other; and hence the mixture of aliments is probably less unhealthy in France and Spain, than in England, where so much less fire is used in preparing them, than in the former countries.

As too great a mixture of glaring colours, which are related to each other, becomes painful to the eye, so too great a mixture of related aliments oppresses the stomach, and debilitates the powers of the system. The original colours of the sky, and of the surface of the globe, have ever been found the most permanently agreeable to the eye. In like manner, I am disposed to believe that there are certain simple aliments which correspond, in their sensible qualities, with the intermediate colours of *blue* and *green*, that are most permanently agreeable to the tongue and stomach, and that every deviation from them is a departure from the simplicity of health and nature.

11. While nature seems to have limited us to simplicity in aliment, is not this restriction abundantly compensated by the variety of tastes which she allows us to impart to it, in order to diversify and increase the pleasure of eating? It is remarkable that salt, sugar, mustard, horse-radish, capers, and spices of all kinds, according to Mr. Gosse's experiments, related by Abbè Spallanzani,* all contribute not only to render aliments savoury, but to promote their digestion.

12. When we consider, that part of the art of cookery consists in rendering the taste of aliments agreeable, is it not probable that the pleasure of eating might be increased beyond our present knowledge upon that subject, by certain new arrangements or mixtures of the substances which are used, to impart a pleasant taste to our aliment?

13. Should philosophers ever stoop to this subject, may they not discover and ascertain a table of the relations of sapid bodies to each other, with the same accuracy that they have ascertained the relation of the numerous objects of chemistry to each other?

* Dissertations, vol. I. p. 326.

14. When the tongue and stomach agree in the same kinds of aliment, may not the increase of the pleasure of eating be accompanied with an increase of health and prolongation of life ?

15. Upon the pleasure of eating, I shall add the following remarks. In order to render it truly exquisite, it is necessary that all the senses, except that of taste, should be as *quiescent* as possible. Those persons mistake the nature of the appetite for food, who attempt to whet it by accompanying a dinner by a band of music, or by connecting the dining table with an extensive and delightful prospect. The undue excitement of one sense always produces weakness in another. Even conversation sometimes detracts from the pleasure of eating ; hence great feeders love to eat in silence, or alone ; and hence the speech of a passionate Frenchman, while dining in a talkative company, was not so improper as might be at first imagined. “ Hold your tongues (said he) I cannot taste my dinner.” I know a physician, who, upon the same principle, always shuts his eyes, and requests silence in a sick chamber, when he wishes to determine by the pulse the propriety of blood-letting, in cases where its indication is doubtful. His perceptions become more distinct, by confining his whole attention to the sense of feeling.

It is impossible to mention the circumstance of the senses acting only in succession to each other in the enjoyment of pleasure, without being struck with the impartial goodness of Heaven, in placing the rich and the poor so much upon a level in the pleasures of the table. Could the numerous objects of pleasure, which are addressed to the ears and the eyes, have been possessed at the same time with the pleasure of eating, the rich would have commanded three times as much pleasure in that enjoyment as the poor ; but this is so far from being the case, that a king has no advantage over a beggar, in eating the same kind of aliment.

THE RESULT OF OBSERVATIONS

MADE

UPON THE DISEASES

WHICH OCCURRED

IN THE MILITARY HOSPITALS

OF THE UNITED STATES,

DURING THE REVOLUTIONARY WAR BETWEEN GREAT BRITAIN
AND THE UNITED STATES.

RESULT OF OBSERVATIONS, &c.

1. THE army, when in tents, was always more sickly than in the open air. It was likewise more healthy when it was kept in motion, than when it lay in an encampment.

2. Young men under twenty years of age were subject to the greatest number of camp diseases.

3. The southern troops were more sickly than the northern or eastern troops.

4. The native Americans were more sickly than the natives of Europe who served in the American army.

5. Men above thirty and five and thirty years of age were the hardiest soldiers in the army. Perhaps the reason why the natives of Europe

were more healthy than the native Americans was, they were more advanced in life.

6. The southern troops sickened from the want of salt provisions. Their strength and spirits were restored only by means of salted meat. I once saw a private in a Virginia regiment throw away his ration of choice fresh beef, and give a dollar for a pound of salted bacon.

7. Those officers who wore flannel shirts or waistcoats next to their skins, in general, escaped fevers and diseases of all kinds.

8. The principal diseases in the hospitals were the typhus gravior and mitior of Doctor Cullen. Men who came into the hospitals with pleurisies or rheumatisms soon lost the types of their original diseases, and suffered, or died, by the above-mentioned states of fever.

9. The typhus mitior always prevailed most, and with the worst symptoms, in winter. A free air, which could only be obtained in summer, always prevented, or mitigated it.

10. In all those cases, where the contagion was received, cold seldom failed to render it ac-

tive. Whenever an hospital was removed in winter, one half of the patients generally sickened on the way, or soon after their arrival at the place to which they were sent.

11. Drunken soldiers and convalescents were most subject to this fever.

12. Those patients in this fever, who had large ulcers on their backs or limbs, generally recovered.

13. I met with several instances of buboes, also of ulcers in the throat, as described by Doctor Donald Monro. They were mistaken by some of the junior surgeons for venereal sores, but they yielded to the common remedies of the hospital fever.

14. There were many instances of patients in this fever, who suddenly fell down dead, upon being moved, without any previous symptoms of approaching dissolution. This was more especially the case, when they arose to go to stool.

15. The contagion of this fever was frequently conveyed from the hospital to the camp, by means of blankets and clothes.

16. Those black soldiers who had been previously slaves died in a greater proportion by this fever, or had a much slower recovery from it, than the same number of white soldiers.

17. The remedies which appeared to do most service in this disease were vomits of tartar emetic, gentle dozes of laxative salts, bark, wine, volatile salt, opium, and blisters.

18. An emetic seldom failed of checking this fever, if exhibited while it was in a *forming* state, and before the patient was confined to his bed.

19. Many causes concurred to produce, and increase this fever ; such as the want of cleanliness, excessive fatigue, the ignorance or negligence of officers in providing suitable diet and accommodations for their men, the general use of linen instead of woollen clothes in the summer months, and the crowding too many patients together in one hospital, with such other inconveniences and abuses, as usually follow the union of the *purveying* and *directing* departments of hospitals in the *same* persons. But there is one more cause of this fever which remains to be mentioned, and that is, the sudden assembling of a great number of persons together of different habits and manners, such

as the soldiers of the American army were in the years 1776 and 1777. Doctor Blane informs us, in his observations upon the diseases of seamen, "that it sometimes happens that a ship with a long established crew shall be very *healthy*, yet if strangers are introduced among them, who are also *healthy*, sickness will be mutually produced." The history of diseases furnishes many proofs of the truth of this assertion.* It is very remarkable, that while the American army at Cambridge, in the year 1775, consisted only of New Englandmen (whose habits and manners were the same) there was scarcely any sickness among them. It was not till the troops of the eastern, middle, and southern states met at New York and Ticonderoga, in the year 1776, that the typhus became universal, and spread with such peculiar mortality in the armies of the United States.

20. The dysentery prevailed, in the summer of 1777, in the military hospitals of New Jersey, but

* "Cleanliness is founded on a natural aversion to what is unseemly and offensive in the persons of others : and there seems also to be an instinctive horror at strangers implanted in human nature for the same purpose, as is visible in young children, and uncultivated people. In the early ages of Rome, the same word signified both a stranger and an enemy." Dr. Blane, p. 225.

with very few instances of mortality. This dysentery was frequently followed by an obstinate diarrhœa, in which the warm bath was found in many cases to be an effectual remedy.

21. I saw several instances of fevers occasioned by the use of the common ointment made of the flour of sulphur and hog's lard, for the cure of the itch. The fevers were probably brought on by the exposure of the body to the cold air, in the usual method in which that ointment is applied. I have since learned, that the itch may be cured as speedily by rubbing the parts affected, two or three times, with the dry flour of sulphur, and that no inconvenience, and scarcely any smell, follow this mode of using it.

22. In gun-shot wounds of the joints, Mr. Ranby's advice of amputating the limb was followed with success. I saw two cases of death where this advice was neglected.

23. There was one instance of a soldier who lost his hearing, and another of a soldier who had been deaf who recovered his hearing, by the noise of artillery in battle.

24. Those soldiers who were billeted in private houses generally escaped the hospital fever, and recovered soonest from all their diseases.

25. Hospitals built of coarse logs, with *ground* floors, with fire-places in the middle of them, and a hole in the roof, for the discharge of smoke, were found to be very conducive to the recovery of the soldiers from the hospital fever. 'This form of a military hospital was introduced into the army by Dr. Tilton, of the state of Delaware.*

26. In fevers and dysenteries, those soldiers recovered most certainly, and most speedily, who lay at the greatest distance from the walls of the hospitals. This important fact was communicated to me by the late Dr. Beardsley, of Connecticut.

27. Soldiers are but little more than adult children. That officer, therefore, will best perform his duty to his men, who obliges them to take the most care of their HEALTH.

* "It is proved, in innumerable instances, that sick men recover health sooner and better in sheds, huts, and barns, exposed occasionally to wind, and sometimes to rain, than in the most superb hospitals in Europe." Jackson's Remarks on the Constitution of the Medical Department of the British Army, p. 340.

28. Hospitals are the sinks of human life in an army. They robbed the United States of more citizens than the sword. Humanity, economy, and philosophy, all concur in giving a preference to the conveniences and wholesome air of private houses ; and should war continue to be the absurd and unchristian mode of deciding national disputes, it is to be hoped that the progress of science will so far mitigate one of its greatest calamities, as to produce an abolition of hospitals for acute diseases. Perhaps there are no cases of sickness, in which reason and religion do not forbid the seclusion of our fellow creatures from the offices of humanity in private families, except where they labour under the calamities of madness and the venereal disease, or where they are the subjects of some of the operations of surgery.

AN INQUIRY
INTO THE
EFFECTS OF ARDENT SPIRITS
UPON THE
HUMAN BODY AND MIND.
WITH
AN ACCOUNT OF THE MEANS OF PREVENTING,
AND OF
THE REMEDIES FOR CURING THEM.

AN INQUIRY, &c.

BY ardent spirits, I mean those liquors only which are obtained by distillation from fermented substances of any kind. To their effects upon the bodies and minds of men, the following inquiry shall be exclusively confined. Fermented liquors contain so little spirit, and that so intimately combined with other matters, that they can seldom be drunken in sufficient quantities to produce intoxication, and its subsequent effects, without exciting a disrelish to their taste, or pain, from their distending the stomach. They are moreover, when taken in a moderate quantity, generally innocent, and often have a friendly influence upon health and life.

The effects of ardent spirits divide themselves into such as are of a prompt, and such as are of a

chronic nature. The former discover themselves in drunkenness, and the latter, in a numerous train of diseases and vices of the body and mind.

I. I shall begin by briefly describing their prompt, or immediate effects, in a fit of drunkenness.

This odious disease (for by that name it should be called) appears with more or less of the following symptoms, and most commonly in the order in which I shall enumerate them.

1. Unusual garrulity.
2. Unusual silence.
3. Captiousness, and a disposition to quarrel.
4. Uncommon good humour, and an insipid simpering, or laugh.
5. Profane swearing, and cursing.
6. A disclosure of their own, or other people's secrets.
7. A rude disposition to tell those persons in company, whom they know, their faults.

8. Certain immodest actions. I am sorry to say, this sign of the first stage of drunkenness sometimes appears in women, who, when sober, are uniformly remarkable for chaste and decent manners.

9. A clipping of words.

10. Fighting; a black eye, or a swelled nose, often mark this grade of drunkenness.

11. Certain extravagant acts, which indicate a temporary fit of madness. These are singing, hallooing, roaring, imitating the noises of brute animals, jumping, tearing off clothes, dancing naked, breaking glasses and china, and dashing other articles of household furniture upon the ground, or floor. After a while the paroxysm of drunkenness is completely formed. The face now becomes flushed; the eyes project, and are somewhat watery; winking is less frequent than is natural; the under lip is protruded; the head inclines a little to one shoulder; the jaw falls; belchings and hiccup take place; the limbs totter; the whole body staggers. The unfortunate subject of this history next falls on his seat; he looks around him with a vacant countenance, and mutters inarticulate sounds to himself.

He attempts to rise and walk ; in this attempt, he falls upon his side, from which he gradually turns upon his back. He now closes his eyes, and falls into a profound sleep, frequently attended with snoring, and profuse sweats, and sometimes with such a relaxation of the muscles which confine the bladder and the lower bowels, as to produce a symptom which delicacy forbids me to mention. In this condition, he often lies from ten, twelve, and twenty-four hours, to two, three, four, and five days, an object of pity and disgust to his family and friends. His recovery from this fit of intoxication is marked with several peculiar appearances. He opens his eyes, and closes them again ; he gapes, and stretches his limbs ; he then coughs and pukes ; his voice is hoarse ; he rises with difficulty, and staggers to a chair ; his eyes resemble balls of fire ; his hands tremble ; he loathes the sight of food ; he calls for a glass of spirits to compose his stomach ; now and then he emits a deep-fetched sigh, or groan, from a transient twinge of conscience, but he more frequently scolds, and curses every thing around him. In this state of languor and stupidity he remains for two or three days, before he is able to resume his former habits of business and conversation.

Pythagoras we are told maintained that the souls of men, after death, expiated the crimes committed by them in this world, by animating certain brute animals ; and that the souls of those animals, in their turns, entered into men, and carried with them all their peculiar qualities and vices. This doctrine of one of the wisest and best of the Greek philosophers, was probably intended only to convey a lively idea of the changes which are induced in the body and mind of man by a fit of drunkenness. In folly, it causes him to resemble a calf ; in stupidity, an ass ; in roaring, a mad bull ; in quarrelling, and fighting, a dog ; in cruelty, a tiger ; in feter, a skunk ; in filthiness, a hog ; and in obscenity, a he-goat.

It belongs to the history of drunkenness to remark, that its paroxysms occur, like the paroxysms of many diseases, at certain periods, and after longer or shorter intervals. They often begin with annual, and gradually increase in their frequency, until they appear in quarterly, monthly, weekly, and quotidian or daily periods. Finally, they afford scarcely any marks of remission, either during the day or the night. There was a citizen of Philadelphia, many years ago, in whom drunkenness appeared in this protracted form. In speaking of him to one of his neighbours, I said,

“Does he not *sometimes* get drunk?” “You mean,” said his neighbour, “is he not *sometimes* sober?”

It is further remarkable, that drunkenness resembles certain hereditary, family, and contagious diseases. I have once known it to descend from a father to four out of five of his children. I have seen three, and once four brothers, who were born of sober ancestors, affected by it, and I have heard of its spreading through a whole family composed of members not originally related to each other. These facts are important, and should not be overlooked by parents, in deciding upon the matrimonial connections of their children.

Let us next attend to the chronic effects of ardent spirits upon the body and mind. In the body, they dispose to every form of acute disease; they moreover *excite* fevers in persons predisposed to them, from other causes. This has been remarked in all the yellow fevers which have visited the cities of the United States. Hard drinkers seldom escape, and rarely recover from them. The following diseases are the usual consequences of the habitual use of ardent spirits, viz.

1. A decay of appetite, sickness at stomach, and a puking of bile, or a discharge of a frothy and viscid phlegm by hawking, in the morning.

2. Obstructions of the liver. The fable of Prometheus, on whose liver a vulture was said to prey constantly, as a punishment for his stealing fire from heaven, was intended to illustrate the painful effects of ardent spirits upon that organ of the body.

3. Jaundice and dropsy of the belly and limbs, and finally of every cavity in the body. A swelling in the feet and legs is so characteristic a mark of habits of intemperance, that the merchants in Charleston, I have been told, cease to trust the planters of South Carolina, as soon as they perceive it. They very naturally conclude industry and virtue to be extinct in that man, in whom that symptom of disease has been produced by the intemperate use of distilled spirits.

4. Hoarseness, and a husky cough, which often terminate in consumption, and sometimes in an acute and fatal disease of the lungs.

5. Diabetes, that is, a frequent and weakening discharge of pale, or sweetish urine.

6. Redness and eruptions on different parts of the body. They generally begin on the nose, and after gradually extending all over the face, sometimes descend to the limbs in the form of leprosy. They have been called "rum-buds," when they appear in the face. In persons who have occasionally survived these effects of ardent spirits on the skin, the face after a while becomes bloated, and its redness is succeeded by a death-like paleness. Thus the same fire which produces a red colour in iron, when urged to a more intense degree, produces what has been called a white heat.

7. A fetid breath, composed of every thing that is offensive in putrid animal matter.

8. Frequent and disgusting belchings. Dr. Haller relates the case of a notorious drunkard having been suddenly destroyed, in consequence of the vapour discharged from his stomach by belching accidentally taking fire, by coming in contact with the flame of a candle.

9. Epilepsy.

10. Gout, in all its various forms of swelled limbs, colic, palsy, and apoplexy.

Lastly, 11. Madness. The late Dr. Waters, while he acted as house pupil and apothecary of the Pennsylvania hospital, assured me, that in one-third of the patients confined by this terrible disease it had been induced by ardent spirits.

Most of the diseases which have been enumerated are of a mortal nature. They are more certainly induced, and terminate more speedily in death, when spirits are taken in such quantities, and at such times, as to produce frequent intoxication: but it may serve to remove an error with which some intemperate people console themselves, to remark, that ardent spirits often bring on fatal diseases without producing drunkenness. I have known many persons destroyed by them, who were never completely intoxicated during the whole course of their lives. The solitary instances of longevity which are now and then met with in hard drinkers, no more disprove the deadly effects of ardent spirits, than the solitary instances of recoveries from apparent death by drowning, prove that there is no danger to life from a human body lying an hour or two under water.

The body after its death, from the use of distilled spirits, exhibits by dissection certain appearances which are of a peculiar nature. The fibres

of the stomach and bowels are contracted; abscesses, gangrene, and schirri, are found in the viscera; the bronchial vessels are contracted; the blood-vessels and tendons, in many parts of the body, are more or less ossified; and even the hair of the head possesses a crispness, which renders it less valuable to wig-makers than the hair of sober people.

Not less destructive are the effects of ardent spirits upon the human mind. They impair the memory, debilitate the understanding, and pervert the moral faculties. It was probably from observing these effects of intemperance in drinking upon the mind, that a law was formerly passed in Spain, which excluded drunkards from being witnesses in a court of justice. But the demoralizing effects of distilled spirits do not stop here. They produce not only falsehood, but fraud, theft, uncleanness, and murder. Like the demoniac mentioned in the New Testament, their name is "legion," for they convey into the soul a host of vices and crimes.

A more affecting spectacle cannot be exhibited, than a person into whom this infernal spirit, generated by habits of intemperance, has entered. It is more or less affecting, according to the station

the person fills in a family, or in society, who is possessed by it. Is he a husband? How deep the anguish which rends the bosom of his wife! Is she a wife? Who can measure the shame and aversion which she excites in her husband! Is he the father, or is she the mother of a family of children? See their averted faces from their parent, and their blushing looks at each other! Is he a magistrate? or has he been chosen to fill a high and respectable station in the councils of his country? What humiliating fears of corruption in the administration of the laws, and of the subversion of public order and happiness, appear in the countenances of all who see him! Is he a minister of the gospel? Here language fails me. —If angels weep,—it is at such a sight.

In pointing out the evils produced by ardent spirits, let us not pass by their effects upon the estates of the persons who are addicted to them. Are they inhabitants of cities? Behold their houses stripped gradually of their furniture, and pawned, or sold by a constable, to pay tavern debts! See their names upon record in the dockets of every court, and whole pages of newspapers filled with advertisements of their estates for public sale! Are they inhabitants of country places? Behold their houses with shattered windows! their barns with

leaky roofs ! their gardens over-run with weeds ! their fields with broken fences ! their hogs without yokes ! their sheep without wool ! their cattle and horses without fat ! and their children filthy, and half clad, without manners, principles, and morals ! This picture of agricultural wretchedness is seldom of long duration. The farms and property thus neglected, and depreciated, are seized and sold for the benefit of a groupe of creditors. The children that were born with the prospect of inheriting them are bound out to service in the neighbourhood ; while their parents, the unworthy authors of their misfortunes, ramble into new and distant settlements, alternately fed on their way by the hand of charity, or a little casual labour.

Thus we see poverty and misery, crimes and infamy, diseases and death, are all the natural and usual consequences of the intemperate use of ardent spirits.

I have classed death among the consequences of hard drinking. But it is not death from the immediate hand of the Deity, nor from any of the instruments of it which were created by him. It is death from SUICIDE. Yes ! thou poor degraded creature, who art daily lifting the poisoned bowl to thy lips, cease to avoid the unhallowed ground

in which the self-murderer is interred, and wonder no longer that the sun should shine, and the rain fall, and the grass look green, upon his grave. Thou art perpetrating gradually, by the use of ardent spirits, what he has effected suddenly, by opium or a halter. Considering how many circumstances, from a sudden gust of passion, or from derangement, may palliate his guilt, or that (unlike yours) it was not preceded and accompanied by any other crime, it is probable his condemnation will be less than yours at the day of judgment.

I shall now take notice of the occasions and circumstances which are supposed to render the use of ardent spirits necessary, and endeavour to show that the arguments in favour of their use in such cases are founded in error, and that in each of them, ardent spirits, instead of affording strength to the body, increase the evils they are intended to relieve.

1. They are said to be necessary in very cold weather. This is far from being true ; for the temporary warmth they produce is always succeeded by a greater disposition in the body to be affected by cold. Warm dresses, a plentiful meal just before exposure to the cold, and eating occa-

sionally a little gingerbread, or any other cordial food, is a much more durable method of preserving the heat of the body in cold weather.

2. They are said to be necessary in very warm weather. Experience proves that they increase instead of lessening the effects of heat upon the body, and thereby dispose to diseases of all kinds. Even in the warm climate of the West Indies, Dr. Bell asserts this to be true. “Rum (says this author) whether used habitually, moderately, or in excessive quantities, in the West Indies, always diminishes the strength of the body, and renders men more susceptible of disease, and unfit for any service in which vigour or activity is required.”* As well might we throw oil into a house, the roof of which was on fire, in order to prevent the flames from extending to its inside, as pour ardent spirits into the stomach, to lessen the effects of a hot sun upon the skin.

3. Nor do ardent spirits lessen the effects of hard labour upon the body. Look at the horse: with every muscle of his body swelled from morning till night in the plough, or a team, does he

* Inquiry into the causes which produce, and the means of preventing diseases among British officers, soldiers, and others, in the West Indies.

make signs for a draught of toddy or a glass of spirits, to enable him to cleave the ground, or to climb a hill? No; he requires nothing but cool water, and substantial food. There is no nourishment in ardent spirits. The strength they produce in labour is of a transient nature, and is always followed by a sense of weakness and fatigue.

But are there no conditions of the human body in which ardent spirits may be given? I answer, there are. 1st. When the body has been suddenly exhausted of its strength, and a disposition to faintness has been induced. Here a few spoonful, or a wine-glassful of spirits, with or without water, may be administered with safety and advantage. In this case we comply strictly with the advice of Solomon, who restricts the use of "strong drink" only "to him who is ready to perish." 2dly. When the body has been exposed for a long time to wet weather, more especially if it be combined with cold. Here a moderate quantity of spirits is not only safe, but highly proper to obviate debility, and to prevent a fever. They will more certainly have those salutary effects, if the feet are at the same time bathed with them, or a half pint of them poured into the shoes or boots. These I believe are the only two cases, in which distilled spirits are useful or necessary to persons in health.

But it may be said, if we reject spirits from being a part of our drinks, what liquors shall we substitute in their room? I answer, in the first place,

1. SIMPLE WATER. I have known many instances of persons, who have followed the most laborious employments for many years in the open air, and in warm and cold weather, who never drank any thing but water, and enjoyed uninterrupted good health. Dr. Moseley, who resided many years in the West Indies, confirms this remark. “ I aver (says the Doctor) from my own knowledge and custom, as well as the custom and observations of many other people, that those who drink nothing but water, or make it their principal drink, are but little affected by the climate, and can undergo the greatest fatigue without inconvenience, and are never subject to troublesome or dangerous diseases.”

Persons who are unable to relish this simple beverage of nature, may drink some one, or of all the following liquors, in preference to ardent spirits.

2. CYDER. This excellent liquor contains a small quantity of spirit, but so diluted, and blunt-

ed, by being combined with a large quantity of saccharine matter, and water, as to be perfectly wholesome. It sometimes disagrees with persons subject to the rheumatism, but it may be made inoffensive to such people, by extinguishing a red hot iron in it, or by mixing it with water. It is to be lamented, that the late frosts in the spring so often deprive us of the fruit which affords this liquor. The effects of these frosts have been in some measure obviated by giving an orchard a north-west exposure, so as to check too early vegetation, and by kindling two or three large fires of brush or straw, to the windward of the orchard, the evening before we expect a night of frost. This last expedient has in many instances preserved the fruit of an orchard, to the great joy and emolument of the ingenious husbandman.

3. MALT LIQUORS. The grain from which these liquors are obtained is not liable, like the apple, to be affected by frost, and therefore they can be procured at all times, and at a moderate price. They contain a good deal of nourishment; hence we find many of the poor people in Great Britian endure hard labour with no other food than a quart or three pints of beer, with a few pounds of bread in a day. As it will be difficult to prevent small beer from becoming

sour in warm weather, an excellent substitute may be made for it by mixing bottled porter, ale, or strong beer, with an equal quantity of water ; or a pleasant beer may be made by adding to a bottle of porter, ten quarts of water, and a pound of brown sugar, or a pint of molasses. After they have been well mixed, pour the liquor into bottles, and place them, loosely corked, in a cool cellar. In two or three days, it will be fit for use. A spoonful of ginger added to the mixture renders it more lively, and agreeable to the taste.

3. WINES. These fermented liquors are composed of the same ingredients as cyder, and are both cordial and nourishing. The peasants of France, who drink them in large quantities, are a sober and healthy body of people. Unlike ardent spirits, which render the temper irritable, wines generally inspire cheerfulness and good humour. It is to be lamented that the grape has not as yet been sufficiently cultivated in our country, to afford wine to our citizens ; but many excellent substitutes may be made for it, from the native fruits of all the states. If two barrels of cyder, fresh from the press, are boiled into one, and afterwards fermented, and kept for two or three years in a dry cellar, it affords a liquor, which, according to the quality of the apple from

which the cyder is made, has the taste of Malaga, or Rhenish wine. It affords, when mixed with water, a most agreeable drink in summer. I have taken the liberty of calling it POMONA WINE. There is another method of making a pleasant wine from the apple, by adding four and twenty gallons of new cyder to three gallons of syrup made from the expressed juice of sweet apples. When thoroughly fermented, and kept for a few years, it becomes fit for use. The blackberry of our fields, and the raspberry and currant of our gardens, afford likewise an agreeable and wholesome wine, when pressed and mixed with certain proportions of sugar and water, and a little spirit, to counteract their disposition to an excessive fermentation. It is no objection to these cheap and home-made wines, that they are unfit for use until they are two or three years old. The foreign wines in common use in our country require not only a much longer time to bring them to perfection, but to prevent their being disagreeable, even to the taste.

4. MOLASSES and WATER, also VINEGAR and WATER, sweetened with sugar or molasses, form an agreeable drink in warm weather. It is pleasant and cooling, and tends to keep up those gentle and uniform sweats, on which health and life often de-

pend. Vinegar and water constituted the only drink of the soldiers of the Roman republic, and it is well known they marched and fought in a warm climate, and beneath a load of arms which weighed sixty pounds. Boaz, a wealthy farmer in Palestine, we find treated his reapers with nothing but bread dipped in vinegar. To such persons as object to the taste of vinegar, sour milk, or butter-milk, or sweet milk diluted with water, may be given in its stead. I have known the labour of the longest and hottest days in summer supported, by means of these pleasant and wholesome drinks, with great firmness, and ended, with scarcely a complaint of fatigue.

5. The SUGAR MAPLE affords a thin juice, which has long been used by the farmers in Connecticut as a cool and refreshing drink, in the time of harvest. The settlers in the western counties of the middle states will do well to let a few of the trees which yield this pleasant juice remain in all their fields. They may prove the means, not only of saving their children and grand-children many hundred pounds, but of saving their bodies from disease and death, and their souls from misery beyond the grave.

6. COFFEE possesses agreeable and exhilarating qualities, and might be used with great advantage

to obviate the painful effects of heat, cold, and fatigue upon the body. I once knew a country physician, who made it a practice to drink a pint of strong coffee previously to his taking a long or cold ride. It was more cordial to him than spirits, in any of the forms in which they are commonly used.

The use of the cold bath in the morning, and of the warm bath in the evening, are happily calculated to strengthen the body in the former part of the day, and to restore it in the latter, from the languor and fatigue which are induced by heat and labour.

Let it not be said, ardent spirits have become necessary from habit in harvest, and in other seasons of uncommon and arduous labour. The habit is a bad one, and may be easily broken. Let but half a dozen farmers in a neighbourhood combine to allow higher wages to their labourers than are common, and a sufficient quantity of *any* of the pleasant and wholesome liquors I have recommended, and they may soon, by their example, abolish the practice of giving them spirits. In a little while they will be delighted with the good effects of their association. Their grain and hay will be gathered into their barns in less time, and in a better condition, than formerly, and of course

at a less expence, and a hundred disagreeable, scenes from sickness, contention, and accidents, will be avoided, all of which follow in a greater or less degree the use of ardent spirits.

Nearly all diseases have their predisposing causes. The same thing may be said of the intemperate use of distilled spirits. It will, therefore, be useful to point out the different employments, situations, and conditions of the body and mind, which predispose to the love of those liquors, and to accompany them with directions to prevent persons being ignorantly and undesignedly seduced into the habitual and destructive use of them.

1. Labourers bear with great difficulty long intervals between their meals. To enable them to support the waste of their strength, their stomachs should be constantly, but moderately, stimulated by aliment, and this is best done by their eating four or five times in a day during the seasons of great bodily exertion. The food at this time should be *solid*, consisting chiefly of salted meat. The vegetables used with it should possess some activity, or they should be made savoury by a mixture of spices. Onions and garlic are of a most cordial nature. They composed a part of the diet which enabled the Israelites to endure, in a warm climate,

the heavy tasks imposed upon them by their Egyptian masters; and they were eaten, Horace and Virgil tell us, by the Roman farmers, to repair the waste of their strength by the toils of harvest. There are likewise certain sweet substances, which support the body under the pressure of labour. The negroes in the West Indies become strong, and even fat, by drinking the juice of the sugar cane, in the season of grinding it. The Jewish soldiers were invigorated by occasionally eating raisins and figs. A bread composed of wheat flour, molasses, and ginger (commonly called gingerbread) taken in small quantities during the day, is happily calculated to obviate the debility induced upon the body by constant labour. All these substances, whether of an animal or vegetable nature, lessen the desire, as well as the necessity, for cordial drinks, and impart equable and durable strength to every part of the system.

2. Valetudinarians, especially those who are afflicted with diseases of the stomach and bowels, are very apt to seek relief from ardent spirits. Let such people be cautious how they make use of this dangerous remedy. I have known many men and women of excellent characters and principles, who have been betrayed, by occasional doses of gin and brandy, into a love of those liquors, and have after-

wards fallen sacrifices to their fatal effects. The different preparations of opium are much more safe and efficacious than distilled cordials of any kind, in flatulent or spasmodic affections of the stomach and bowels. So great is the danger of contracting a love for distilled liquors, by accustoming the stomach to their stimulus, that as few medicines as possible should be given in spirituous vehicles, in chronic diseases. A physician, of great eminence and uncommon worth, who died towards the close of the last century, in London, in taking leave of a young physician of this city, who had finished his studies under his patronage, impressed this caution with peculiar force upon him, and lamented at the same time, in pathetic terms, that he had innocently made many sots, by prescribing brandy and water in stomach complaints. It is difficult to tell how many persons have been destroyed by those physicians who have adopted Dr. Brown's indiscriminate practice in the use of stimulating remedies, the most popular of which is ardent spirits, but, it is well known, several of them have died of intemperance in this city since the year 1790. They were probably led to it, by drinking brandy and water, to relieve themselves from the frequent attacks of debility and indisposition, to which the labours of a physician expose him, and for which rest, fasting, a gentle purge, or weak diluting

drinks, would have been safe and more certain cures.

None of these remarks are intended to preclude the use of spirits in the low state of short, or what are called acute diseases, for, in such cases, they produce their effects too soon to create a habitual desire for them.

3. Some people, from living in countries subject to intermitting fevers, endeavour to fortify themselves against them, by taking two or three wine-glasses of bitters, made with spirits, every day. There is great danger of contracting habits of intemperance from this practice. Besides, this mode of preventing intermittents is far from being a certain one. A much better security against them, is a tea-spoonful of the jesuits bark, taken every morning during a sickly season. If this safe and excellent medicine cannot be had, a gill or half a pint of a strong watery infusion of centaury, camomile, wormwood, or rue, mixed with a little of the calamus of our meadows, may be taken every morning, with nearly the same advantage as the jesuits bark. Those persons who live in a sickly country, and cannot procure any of the preventives of autumnal fevers which have been mentioned, should avoid the morning and evening air; should

kindle fires in their houses, on damp days, and in cool evenings, throughout the whole summer ; and put on winter clothes about the first week in September. The last part of these directions applies only to the inhabitants of the middle states.

4. Men who follow professions, which require constant exercise of the faculties of their minds, are very apt to seek relief, by the use of ardent spirits, from the fatigue which succeeds great mental exertions. To such persons, it may be a discovery to know, that TEA is a much better remedy for that purpose. By its grateful and gentle stimulus, it removes fatigue, restores the excitement of the mind, and invigorates the whole system. I am no advocate for the excessive use of tea. When taken too strong, it is hurtful, especially to the female constitution ; but when taken of a moderate degree of strength, and in moderate quantities with sugar and cream, or milk, I believe it is, in general, innoxious, and at all times to be preferred to ardent spirits, as a cordial for studious men. The late Anthony Benezet, one of the most laborious schoolmasters I ever knew, informed me, he had been prevented from the love of spirituous liquors by acquiring a love for tea in early life. Three or four cups, taken in an afternoon, carried off the fatigue of a whole day's labour in his school. This

worthy man lived to be seventy-one years of age, and died of an acute disease, with the full exercise of all the faculties of his mind. But the use of tea counteracts a desire for distilled spirits, during great *bodily*, as well as mental exertions. Of this, captain Forest has furnished us with a recent and remarkable proof, in his History of a Voyage from Calcutta to the Marqui Archipelago. "I have always observed (says this ingenious mariner) when sailors drink TEA, it weans them from the thoughts of drinking strong liquors, and pernicious grog; and with this they are soon contented. Not so with whatever will intoxicate, be it what it will. This has always been my remark. I therefore always encourage it, without their knowing why."

5. Women have sometimes been led to seek relief from what is called breeding sickness, by the use of ardent spirits. A little gingerbread, or biscuit, taken occasionally, so as to prevent the stomach being empty, is a much better remedy for that disease.

6. Persons under the pressure of debt, disappointments in worldly pursuits, and guilt, have sometimes sought to drown their sorrows in strong drink. The only radical cure for those evils is to be found in religion; but where its support is

not resorted to, wine and opium should always be preferred to ardent spirits. They are far less injurious to the body and mind than spirits, and the habits of attachment to them are easily broken, after time and repentance have removed the evils they were taken to relieve.

7. The sociable and imitative nature of man often disposes him to adopt the most odious and destructive practices from his companions. The French soldiers who conquered Holland, in the year 1794, brought back with them the love and use of brandy, and thereby corrupted the inhabitants of several of the departments of France, who had been previously distinguished for their temperate and sober manners. Many other facts might be mentioned, to show how important it is to avoid the company of persons addicted to the use of ardent spirits.

8. Smoking and chewing tobacco, by rendering water and simple liquors insipid to the taste, dispose very much to the stronger stimulus of ardent spirits. The practice of smoking segars has, in every part of our country, been more followed by a general use of brandy and water as a common drink, more especially by that class of citizens who have not been in the habit of drinking wine, or

malt liquors. The less, therefore, tobacco is used in the above ways, the better.

9. No man ever became suddenly a drunkard. It is by gradually accustoming the taste and stomach to ardent spirits, in the forms of GROG and TODDY, that men have been led to love them in their more destructive mixtures, and in their simple state. Under the impression of this truth, were it possible for me to speak with a voice so loud as to be heard from the river St. Croix to the remotest shores of the Mississippi, which bound the territory of the United States, I would say, Friends and fellow-citizens, avoid the habitual use of those two seducing liquors, whether they be made with brandy, rum, gin, Jamaica spirits, whiskey, or what is called cherry bounce. It is true, some men, by limiting the strength of those drinks by measuring the spirit and water, have drunken them for many years, and even during a long life, without acquiring habits of intemperance or intoxication, but many more have been insensibly led, by drinking weak toddy and grog first at their meals, to take them for their constant drink, in the intervals of their meals; afterwards to take them, of an increased strength, before breakfast in the morning; and finally to destroy themselves by drinking undiluted spirits, during every hour of

the day and night. I am not singular in this remark. "The consequences of drinking rum and water, or *grog*, as it is called (says Dr. Moseley) is, that habit increases the desire of more spirits, and decreases its effects; and there are very few grog-drinkers who long survive the practice of debauching with it, without acquiring the odious nuisance of dram-drinkers breath, and down right stupidity and impotence."* To enforce the caution against the use of those two apparently innocent and popular liquors still further, I shall select one instance, from among many, to show the ordinary manner in which they beguile and destroy their votaries. A citizen of Philadelphia, once of a fair and sober character, drank toddy for many years, as his constant drink. From this he proceeded to drink grog. After a while nothing would satisfy him but slings made of equal parts of rum and water, with a little sugar. From slings he advanced to raw rum, and from common rum to Jamaica spirits. Here he rested for a few months, but at length, finding even Jamaica spirits were not strong enough to warm his stomach, he made it a constant practice to throw a table-spoonful of ground pepper in each glass of his spirits, in order, to use his own words, "to take off their coldness." He soon after died a martyr to his intemperance.

* Treatise on Tropical Diseases.

Ministers of the gospel, of every denomination, in the United States! aid me with all the weight you possess in society, from the dignity and usefulness of your sacred office, to save our fellow men from being destroyed by the great destroyer of their lives and souls. In order more successfully to effect this purpose, permit me to suggest to you to employ the same wise modes of instruction, which you use in your attempts to prevent their destruction by other vices. You expose the evils of covetousness, in order to prevent theft; you point out the sinfulness of impure desires, in order to prevent adultery; and you dissuade from anger, and malice, in order to prevent murder. In like manner, denounce, by your preaching, conversation, and examples, the seducing influence of toddy and grog, when you aim to prevent all the crimes and miseries which are the offspring of strong drink.

We have hitherto considered the effects of ardent spirits upon individuals, and the means of preventing them. I shall close this head of our inquiry, by a few remarks upon their effects upon the population and welfare of our country, and the means of obviating them.

It is highly probable not less than 4000 people die annually, from the use of ardent spirits, in the

United States. Should they continue to exert this deadly influence upon our population, where will their evils terminate? This question may be answered, by asking, where are all the Indian tribes, whose numbers and arms formerly spread terror among their civilized neighbours? I answer, in the words of the famous Mingo chief, "the blood of many of them flows not in the veins of any human creature." They have perished, not by pestilence, nor war, but by a greater foe to human life than either of them—ardent spirits. The loss of 4000 American citizens, by the yellow fever, in a single year, awakened general sympathy and terror, and called forth all the strength and ingenuity of laws, to prevent its recurrence. Why is not the same zeal manifested in protecting our citizens from the more general and consuming ravages of distilled spirits? Should the customs of civilized life preserve our nation from extinction, and even from an increase of mortality, by those liquors; they cannot prevent our country being governed by men, chosen by intemperate and corrupted voters. From such legislators, the republic would soon be in danger. To avert this evil, let good men of every class unite, and besiege the general and state governments with petitions to limit the number of taverns; to impose heavy duties upon ardent spirits; to inflict a mark of disgrace, or a temporary abridgment of some

civil right, upon every man convicted of drunkenness ; and finally to secure the property of habitual drunkards, for the benefit of their families, by placing it in the hands of trustees, appointed for that purpose by a court of justice.

To aid the operation of these laws, would it not be extremely useful for the rulers of the different denominations of christian churches to unite, and render the sale and consumption of ardent spirits a subject of ecclesiastical jurisdiction ? The methodists, and society of friends, have, for some time past, viewed them as contraband articles to the pure laws of the gospel, and have borne many public and private testimonies against making them the objects of commerce. Their success, in this benevolent enterprise, affords ample encouragement for all other religious societies to follow their example.

We come now to the THIRD part of this inquiry, that is, to mention the remedies for the evils which are brought on by the excessive use of distilled spirits.

These remedies divide themselves into two kinds.

I. Such as are proper to cure a fit of drunkenness, and

II. Such as are proper to prevent its recurrence, and to destroy a desire for ardent spirits.

I. I am aware that the efforts of science and humanity, in applying their resources to the cure of a disease induced by an act of vice, will meet with a cold reception from many people. But let such people remember, the subjects of our remedies are their fellow creatures, and that the miseries brought upon human nature, by its crimes, are as much the objects of divine compassion (which we are bound to imitate) as the distresses which are brought upon men by the crimes of other people, or which they bring upon themselves by ignorance or accidents. Let us not then pass by the prostrate sufferer from strong drink, but administer to him the same relief we would afford to a fellow creature, in a similar state, from an accidental, and innocent cause.

1. The first thing to be done to cure a fit of drunkenness, is to open the collar, if in a man, and remove all tight ligatures from every other part of the body. The head and shoulders should at the

same time be elevated, so as to favour a more feeble determination of the blood to the brain.

2. The contents of the stomach should be discharged, by thrusting a feather down the throat. It often restores the patient immediately to his senses and feet. Should it fail of exciting a puking,

3. A napkin should be wrapped round the head, and wetted for an hour or two with cold water, or cold water should be poured in a stream upon the head. In the latter way I have sometimes seen it used, when a boy, in the city of Philadelphia. It was applied, by dragging the patient, when found drunk in the street, to a pump, and pumping water upon his head for ten or fifteen minutes. The patient generally rose, and walked off, sober and sullen, after the use of this remedy.

Other remedies, less common, but not less effectual for a fit of drunkenness, are,

4. Plunging the whole body into cold water. A number of gentlemen who had drunken to intoxication, on board a ship in the stream, near Fell's point, at Baltimore, in consequence of their reeling in a small boat, on their way to the shore, in the evening, overset it, and fell into the water.

Several boats from the shore hurried to their relief. They were all picked up, and went home, perfectly sober, to their families.

5. Terror. A number of young merchants, who had drunken together, in a compting-house, on James river, above thirty years ago, until they were intoxicated, were carried away by a sudden rise of the river, from an immense fall of rain. They floated several miles with the current, in their little cabin, half filled with water. An island in the river arrested it. When they reached the shore that saved their lives, they were all sober. It is probable terror assisted in the cure of the persons who fell into the water at Baltimore.

6. The excitement of a fit of anger. The late Dr. Witherspoon used to tell a story of a man in Scotland, who was always cured of a fit of drunkenness by being made angry. The means chosen for that purpose was a singular one. It was talking against religion.

7. A severe whipping. This remedy acts by exciting a revulsion of the blood from the brain to the external parts of the body.

8. Profuse sweats. By means of this evacuation, nature sometimes cures a fit of drunkenness.

Their good effects are obvious in labourers, whom quarts of spirits taken in a day will seldom intoxicate while they sweat freely. If the patient be unable to swallow warm drinks, in order to produce sweats, they may be excited by putting him in a warm bath, or wrapping his body in blankets, under which should be placed half a dozen hot bricks, or bottles filled with hot water.

9. Bleeding. This remedy should always be used, when the former ones have been prescribed to no purpose, or where there is reason to fear, from the long duration of the disease, a material injury may be done to the brain.

It is hardly necessary to add, that each of the above remedies should be regulated by the grade of drunkenness, and the greater or less degree in which the intellects are affected in it.

II. The remedies which are proper to prevent the recurrence of fits of drunkenness, and to destroy the desire for ardent spirits, are religious, metaphysical, and medical. I shall briefly mention them.

1. Many hundred drunkards have been cured of their desire for ardent spirits, by a practical belief in the doctrines of the christian religion. Examples

of the divine efficacy of christianity for this purpose have lately occurred in many parts of the United States.

2. A sudden sense of the guilt contracted by drunkenness, and of its punishment in a future world. It once cured a gentlement in Philadelphia, who, in a fit of drunkenness, attempted to murder a wife whom he loved. Upon being told of it when he was sober, he was so struck with the enormity of the crime he had nearly committed, that he never tasted spirituous liquors afterwards.

3. A sudden sense of shame. Of the efficacy of this deep seated principle in the human bosom, in curing drunkenness, I shall relate three remarkable instances.

A farmer in England, who had been many years in the practice of coming home intoxicated, from a market town, one day observed appearances of rain, while he was in market. His hay was cut, and ready to be housed. To save it, he returned in haste to his farm, before he had taken his customary dose of grog. Upon coming into his house, one of his children, a boy of six years old, ran to his mother, and cried out, "O, mother! father is come home, and he is not drunk." The

father, who heard this exclamation, was so severely rebuked by it, that he suddenly became a sober man.

A noted drunkard was once followed by a favourite goat to a tavern, into which he was invited by his master, and drenched with some of his liquor. The poor animal staggered home with his master, a good deal intoxicated. The next day he followed him to his accustomed tavern. When the goat came to the door, he paused : his master made signs to him to follow him into the house. The goat stood still. An attempt was made to thrust him into the tavern. He resisted, as if struck with the recollection of what he suffered from being intoxicated the night before. His master was so much affected by a sense of shame, in observing the conduct of his goat to be so much more rational than his own, that he ceased from that time to drink spirituous liquors.

A gentleman, in one of the southern states, who had nearly destroyed himself by strong drink, was remarkable for exhibiting the grossest marks of folly in his fits of intoxication. One evening, sitting in his parlour, he heard an uncommon noise in his kitchen. He went to the door, and peeped through the key hole, from whence he saw one of

his negroes diverting his fellow servants, by mimicking his master's gestures and conversation when he was drunk. The sight overwhelmed him with shame and distress, and instantly became the means of his reformation.

4. The association of the idea of ardent spirits with a painful or disagreeable impression upon some part of the body, has sometimes cured the love of strong drink. I once tempted a negro man, who was habitually fond of ardent spirits, to drink some rum (which I placed in his way) and in which I had put a few grains of tartar emetic. The tartar sickened and puked him to such a degree, that he supposed himself to be poisoned. I was much gratified by observing he could not bear the sight, nor smell, of spirits for two years afterwards.

I have heard of a man who was cured of the love of spirits, by working off a puke by large draughts of brandy and water, and I know a gentleman, who in consequence of being affected with a rheumatism, immediately after drinking some toddy, when overcome with fatigue and exposure to the rain, has ever since loathed that liquor, only because it was accidentally associated in his memory with the recollection of the pain he suffered from his disease.

This appeal to that operation of the human mind, which obliges it to associate ideas, accidentally or otherwise combined, for the cure of vice, is very ancient. It was resorted to by Moses, when he compelled the children of Israel to drink the solution of the golden calf (which they had idolized) in water. This solution, if made, as it most probably was, by means of what is called *hepar sulphuris*, was extremely bitter, and nauseous, and could never be recollected afterwards, without bringing into equal detestation the sin which subjected them to the necessity of drinking it. Our knowledge of this principle of association upon the minds and conduct of men should lead us to destroy, by means of other impressions, the influence of all those circumstances, with which the recollection and desire of spirits are combined. Some men drink only in the *morning*, some at *noon*, and some only at *night*. Some men drink only on a *market day*, some at *one* tavern only, and some only in *one kind* of company. Now by finding a new and interesting employment or subject of conversation for drunkards, at the usual times in which they have been accustomed to drink, and by restraining them by the same means from those places and companions, which suggested to them the idea of ardent spirits, their habits of intemperance may be completely destroyed. In the same way the periodical returns of appetite, and a

desire of sleep, have been destroyed in a hundred instances. The desire for strong drink differs from each of them, in being of an artificial nature, and therefore not disposed to return, after being chased for a few weeks from the system.

5. The love of ardent spirits has sometimes been subdued, by exciting a counter passion in the mind. A citizen of Philadelphia had made many unsuccessful attempts to cure his wife of drunkenness. At length, despairing of her reformation, he purchased a hogshead of rum, and, after tapping it, left the key in the door of the room in which it was placed, as if he had forgotten it. His design was to give his wife an opportunity of drinking herself to death. She suspected this to be his motive, in what he had done, and suddenly left off drinking. Resentment here became the antidote to intemperance.

6. A diet consisting wholly of vegetables cured a physician in Maryland of drunkenness, probably by lessening that thirst, which is always more or less excited by animal food.

7. Blisters to the ankles, which were followed by an unusual degree of inflammation, once suspended the love of ardent spirits, for one month, in a lady

in this city. The degrees of her intemperance may be conceived of, when I add, that her grocer's account for brandy alone amounted, annually, to one hundred pounds, Pennsylvania currency, for several years.

8. A violent attack of an acute disease has sometimes destroyed a habit of drinking distilled liquors. I attended a notorious drunkard, in the yellow fever in the year 1798, who recovered, with the loss of his relish for spirits, which has, I believe, continued ever since.

9. A salivation has lately performed a cure of drunkenness, in a person of Virginia. The new disease excited in the mouth and throat, while it rendered the action of the smallest quantity of spirits upon them painful, was happily calculated to destroy the disease in the stomach which prompts to drinking, as well as to render the recollection of them disagreeable, by the laws of association formerly mentioned.

10. I have known an oath, taken before a magistrate, to drink no more spirits, produce a perfect cure of drunkenness. It is sometimes cured in this way in Ireland. Persons who take oaths for this purpose are called *affidavit men*.

11. An advantage would probably arise from frequent representations being made to drunkards, not only of the certainty, but of the *suddenness* of death, from habits of intemperance. I have heard of two persons being cured of the love of ardent spirits, by seeing death suddenly induced by fits of intoxication; in the one case, in a stranger, and in the other, in an intimate friend.

12. It has been said, that the disuse of spirits should be gradual, but my observations authorise me to say, that persons who have been addicted to them should abstain from them *suddenly*, and *entirely*. “Taste not, handle not, touch not,” should be inscribed upon every vessel that contains spirits, in the house of a man who wishes to be cured of habits of intemperance. To obviate, for awhile, the debility which arises from the sudden abstraction of the stimulus of spirits, laudanum, or bitters infused in water, should be taken, and perhaps a larger quantity of beer or wine, than is consistent with the strict rules of temperate living. By the temporary use of these substitutes for spirits, I have never known the transition to sober habits to be attended with any bad effects, but often with permanent health of body, and peace of mind.

OBSERVATIONS. &c.

FOR a history of the different names and symptoms of this disease, I beg leave to refer the reader to practical books, particularly to Doctor Cullen's First Lines. My only design in this inquiry is, to deliver such a theory of the disease, as may lead to a new and successful use of old and common remedies for it.

All the remote and predisposing causes of the tetanus act by inducing preternatural debility, and irritability in the muscular parts of the body. In many cases, the remote causes act alone, but they more frequently require the co-operation of an exciting cause. I shall briefly enumerate, without discriminating them, or pointing out when they act singly, or when in conjunction with each other,

I. Wounds on different parts of the body are the most frequent causes of this disease. It was formerly supposed it was the effect only of a wound, which partially divided a tendon, or a nerve ; but we now know it is often the consequence of læsions which affect the body in a superficial manner. The following is a list of such wounds and læsions as have been known to induce the disease :

1. Wounds in the soles of the feet, in the palms of the hands, and under the nails, by means of nails or splinters of wood.
2. Amputations, and fractures of limbs.
3. Gun-shot wounds.
4. Venesection.
5. The extraction of a tooth, and the insertion of new teeth.
6. The extirpation of a schirrus.
7. Castration.
8. A wound on the tongue.

9. The injury which is done to the feet by frost.

10. The injury which is sometimes done to one of the toes, by stumping it (as it is called) in walking.

11. Cutting a nail too closely. Also,

12. Cutting a corn too closely.

13. Wearing a shoe so tight as to abrade the skin of one of the toes.

14. A wound, not more than an eighth part of an inch, upon the forehead.

15. The stroke of a whip upon the arm, which only broke the skin.

16. Walking too soon upon a broken limb.

17. The sting of a wasp upon the glands penis.

18. A fish bone sticking in the throat.

19. Cutting the naval string in new-born infants.

Between the time in which the body is thus wounded or injured, and the time in which the disease makes its appearance, there is an interval, which extends from one day to six weeks. In the person who injured his toe by stumping it in walking, the disease appeared the next day. The trifling wound on the forehead which I have mentioned, produced both tetanus and death, the day after it was received. I have known two instances of tetanus, from running nails in the feet, which did not appear until six weeks afterwards. In most of the cases of this disease from wounds, which I have seen, there was a total absence of pain and inflammation, or but very moderate degrees of them, and in some of them the wounds had entirely healed, before any of the symptoms of the disease had made their appearance. Wounds and læsions are most apt to produce tetanus, after the long continued application of heat to the body; hence its greater frequency, from these causes, in warm than in cold climates, and in warm than in cold weather, in northern countries.

II. Cold applied suddenly to the body, after it has been exposed to intense heat. Of this Dr. Girdlestone mentions many instances, in his *Treatise upon Spasmodic Affections in India*. It was most commonly induced by sleeping upon the

ground, after a warm day. Such is the dampness and unwholesome nature of the ground, in some parts of that country, that “fowls (the Doctor says) put into coops at night, in the sickly season of the year, and on the same soil that the men slept, were always found dead the next morning, if the coop was not placed at a certain height above the surface of the earth.”* It was brought on by sleeping on a damp pavement in a servant girl of Mr. Alexander Todd, of Philadelphia, in the evening of a day in which the mercury in Fahrenheit’s thermometer stood at 90°. Dr. Chalmers relates an instance of its having been induced by a person’s sleeping without a nightcap, after shaving his head. The late Dr. Bartram informed me, that he had known a draught of cold water produce it in a man who was in a preternaturally heated state. The cold air more certainly brings on this disease, if it be applied to the body in the form of a current. The stiff neck, which is sometimes felt after exposure to a stream of cool air from an open window, is a tendency to a locked jaw, or a feeble and partial tetanus.

III. Worms and certain acrid matters in the alimentary canal. Morgagni relates an instance of

* Page 55.

the former, and I shall hereafter mention instances of the latter in new-born infants.

IV. Certain poisonous vegetables. There are several cases upon record of its being induced by the hemlock dropwort, and the datura stramonium, or Jamestown weed, of our country.

V. It is sometimes a symptom of the bilious remitting and intermitting fever. It is said to occur more frequently in those states of fever in the island of Malta, than in any other part of the world.

VI. It is likewise a symptom of that malignant state of fever which is brought on by the bite of a rabid animal, also of hysteria and gout.

VII. The grating noise produced by cutting with a knife upon a pewter plate excited it in a servant, while he was waiting upon his master's table in London. It proved fatal in three days.

VIII. The sight of food, after long fasting.

IX. Drunkenness.

X. Certain emotions and passions of the mind. Terror brought it on a brewer in this city. He

had been previously debilitated by great labour, in warm weather. I have heard of its having been induced in a man by agitation of mind, occasioned by seeing a girl tread upon a nail. Fear excited it in a soldier who kneeled down to be shot. Upon being pardoned he was unable to rise, from a sudden attack of tetanus. Grief produced it in a case mentioned by Dr. Willan.

XI. Parturition.

All these remote and exciting causes act with more or less certainty and force, in proportion to the greater or less degrees of fatigue which have preceded them.

It has been customary with authors to call all those cases of tetanus, which are not brought on by wounds, symptomatic. They are no more so than those which are said to be idiopathic. They all depend alike upon irritating impressions made upon one part of the body, producing morbid excitement, or disease in another. It is immaterial, whether the impression be made upon the intestines by a worm, upon the ear by an ungrateful noise, upon the mind by a strong emotion, or upon the sole of the foot by a nail; it is alike communicated to the muscles, which, from their previous

debility and irritability, are thrown into commotions by it. In yielding to the impression of irritants, they follow in their contractions the order of their predisposing debility. The muscles which move the lower jaw are affected more early, and more obstinately, than any of the other external muscles of the body, only because they are more constantly in a relaxed, or idle, state.

The negroes in the West Indies are more subject to this disease than white people. This has been ascribed to the greater irritability of their muscular systems, which constitutes a part of its predisposing cause. It is remarkable that their sensibility lessens with the increase of their irritability ; and hence, Dr. Moseley says, they bear surgical operations much better than white people.

The new-born infants of the negroes in the West Indies are often affected with this disease, among whom it is known by the name of the jaw-fall. Dr. Dazille says, that during a residence of thirty years in the islands, and chiefly at St. Domingo, he saw but one instance of it in a white child. It is said one-tenth of all the negro children that are born in the West Indies, die of it. Local circumstances influence its mortality. Nineteen out of twenty black children, Dr. Gordon informed me, in his visit to Philadelphia in the summer of 1806, died

upon a plantation in Berbice, while upon a neighbouring plantation not a single instance of death had ever occurred from it. Dr. Cleghorn informs us that it is a common disease among the white children in Minorca.* I have seen a few cases of it in the children of white persons in Philadelphia. Its causes are,

1. The cutting of the navel-string. This is often done with a pair of dull scissars, by which means the cord is bruised.

2. The acrimony of the meconium retained in the bowels.

3. Cold air acting upon the body, after it has been heated by the air of a hot room.

4. Smoke is supposed to excite it in the negro quarters in the West Indies. Perhaps this, and the preceeding cause induced the great mortality of the disease upon the plantation in Berbice, mentioned by Dr. Gordon.

It is unknown, Dr. Winterbottom informs us, among the native Africans in the neighbourhood of Sierra Leone.

* Diseases of Minorca, p. 46. Philadelphia Edition.

I am aware that it is ascribed by many physicians to only one of the above causes ; but I see no reason why it should not be induced by more than one cause in infants, when we see it brought on by so many different causes in grown people.

The tetanus is not confined to the human species. It often affects horses in the West Indies. I have seen several cases of it in Philadelphia. I have likewise seen it appear in the form of opisthotinos in a pidgeon, brought on by a wound in one of its wings.

The want of uniform success in the treatment of this disease has long been a subject of regret among physicians. It may be ascribed to the use of the same remedies, without any respect to the nature of the causes which produce it, and to an undue reliance upon some one remedy, under a belief of its specific efficacy. Opium has been considered as its antidote, without recollecting that it was one only, of a numerous class of medicines, that are all alike useful in it.

Tetanus, from all its causes, has nearly the same premonitory symptoms. These are, a stiffness in the neck, a disposition to bend forward, in order to

relieve a pain in the back, costiveness, a pain about the external region of the stomach, and a disposition to start in sleep. In this feeble state of the disease, an emetic, a strong dose of laudanum, the warm bath, or a few doses of bark, have often prevented its being completely formed. When it has arisen from a wound, dilating it, if small or healed, and afterwards inflaming it, by applying to it turpentine, common salt, corrosive sublimate, or Spanish flies, have, in many hundred instances, been attended with the same salutary effects.

The disease I have said is seated in the muscles, and, while they are preternaturally excited, the blood-vessels are in a state of reduced excitement. This is evident from the feebleness and slowness of the pulse, and the feeble coherence, or total dissolution, of the blood. The pulse sometimes beats, according to Dr. Lining, but forty strokes in a minute. By stimulating the wound, we not only restore the natural excitement of the blood-vessels, but we produce an inflammatory diathesis in them, which abstracts morbid excitement from the muscular system, and, by equalizing it, cures the disease. This remedy, I acknowledge, has not been as successfully employed in the West-Indies as in the United States, and that for an obvious reason. The blood-vessels in a warm climate refuse to as-

sume an inflammatory action. Stimuli hurry them on suddenly to torpor or gangrene. This is so uniformly the case, that Dr. Dazille not only forbids their application to recent wounds, but advises the most lenient applications to them.* But widely different is the nature of wounds, and of the tension of the blood-vessels, in the inhabitants of northern countries. While Dr. Dallas deplors the loss of 49 out of 50 affected with tetanus from wounds, in the West India islands, I am sure I could mention many hundred instances of the disease being prevented, and a very different proportion of cures being performed, by inflaming the wounds, and exciting a counter *morbid* action in the blood-vessels.

This disease like many others has its anomalies. I have seen it attended with a complete intermission of spasms, and a total relaxation of all the muscles which are usually affected by it, and in one instance I have observed the spasms to be confined exclusively to one side of the body. I have likewise met with a case in a black girl, in whom all the symptoms of the disease occurred, except a trismus or a contraction of the jaw. The force of

* Observations sur le Tetanos, p. 326.

the disease in that part of her body spent itself upon her tongue. She lost the power of speech. The disease was brought on by a wound in her hand. She was cured by tonic remedies.

When the disease is the effect of fever, the same remedies should be given, as are employed in the cure of that fever. I have once unlocked the jaw of a woman, who was seized at the same time with a remitting fever, by an emetic, and I have heard of its being cured in a company of surveyors, in whom it was the effect of an intermittent, by large doses of bark. When it accompanies malignant fever, hysteria, or gout, the remedies for those forms of disease should be employed. Bleeding was highly useful in it, in a case of yellow fever which occurred in Philadelphia in the year 1794.

When it is produced by the suppression of perspiration by means of cold, the warm bath and sweating medicines have been found most useful in it. Nature has in one instance pointed out the use of this remedy, by curing the disease by a miliar eruption on the skin.*

* Burserus.

If it be the effect of poisonous substances taken into the stomach, or of worms in the bowels, the cure should be begun by emetics, purges, and anthelmintic medicines.

Where patients are unable to swallow, from the teeth of the upper and lower jaw pressing upon each other, a tooth or two should be extracted, to open a passage for our medicines into the throat. If this be impracticable, or objected to, they should be injected by way of glyster.

In the locked jaw which arises from the extraction of a tooth, an instrument should be introduced to depress the jaw. This has been done by a noted English dentist in London, with success.

As the habit of diseased action often continues after the removal of its causes, and as some of the remote causes of this disease are beyond the reach of medicine, such remedies should be given as are calculated, by their stimulating power, to overcome the morbid or spasmodic action of the muscles. These are :

1. OPIUM. It should be given in large and frequent doses. Dr. Streltz says he has found from one to two drachms of an alkali, taken in the

course of a day, greatly to aid the action of the opium in this disease.

Dr. Dazille advises the exhibition of opium in glysters, and speaks in high terms of the efficacy of a plaister composed of three drachms of opium and a dram of camphor finely powdered, and applied to the sole of each foot, in the tetanus of the West-Indies.*

2. WINE. This should be given in quarts, and even gallons, daily. Dr. Currie relates a case of a man in the infirmary of Liverpool, who was cured of tetanus, by drinking nearly a quarter cask of Madeira wine. Dr. Hosack speaks in high terms of it, in a letter to Dr. Duncan, and advises its being given without any other stimulating medicine.

3. ARDENT SPIRITS. A quack in New-England has lately cured tetanus, by giving ardent spirits in such quantities as to produce intoxication. Upon being asked his reason for this strange practice, he said he had always observed the jaw to fall in drunken men, and any thing that would produce that effect, he supposed to be proper in the locked jaw.

* Observations sur le Tetanus, p. 286 and 300.

4. The BARK has of late years been used in this disease with success. I had the pleasure of first seeing its good effects in the case of colonel Stone, in whom a severe tetanus followed a wound in the foot, received at the battle of Germantown, in October, 1777.

5. The COLD BATH. This remedy has been revived by Dr. Wright of Jamaica, and has in many instances performed cures of this disease. In one of two cases in which I have used it with success, the patient's jaw opened in a few minutes after the affusion of a single bucket of water upon her body. The disease was occasioned by a slight injury done to one of her toes, by wearing a tight shoe. The signals for continuing the use of the cold bath are, its being followed by a slight degree of fever, and a general warmth of the skin. Where these do not occur, there is reason to believe it will do no service, or perhaps do harm. We have many proofs of the difference in the same disease, and in the operation of the same medicine, in different and opposite climates. Dr. Girdlestone has mentioned the result of the use of the cold bath in tetanus in the East Indies, which furnishes a striking addition to the numerous facts that have been collected upon that subject. He tells us the cold bath uniformly destroyed life, in every case in which it was used.

The reason is obvious. In that extremely debilitating climate, the system in tetanus was prostrated too low, to re-act under the sedative operation of the cold water.

6. The WARM BATH has often been used with success in this disease. Its temperature should be regulated by our wishes to promote sweats, or to produce excitement in the blood-vessels. In the latter case it should rise above the heat of the human body.

7. The OIL OF AMBER acts powerfully upon the muscular system. I have seen the happiest effects from the exhibition of six or eight drops of it, every two hours, in this disease.

8. A SALIVATION has been often recommended for the cure of tetanus, but unfortunately it can seldom be excited in time to do service. I once saw it complete the cure of a sailor in the Pennsylvania hospital, whose life was prolonged by the alternate use of bark and wine. The disease was brought on him by a mortification of his feet, in consequence of their being frost-bitten.

9. Dr. Girdlestone commends BLISTERS in high terms in this disease. He says he never saw

it prove fatal, even where they only produced a redness on the skin.

10. I have heard of *ELECTRICITY* having been used with advantage in tetanus, but I can say nothing in its favour from my own experience.

In order to ensure the utmost benefit from the use of the above remedies, it will be necessary for a physician always to recollect, that the disease is attended with great morbid action, and of course each of the stimulating medicines that has been mentioned should be given, 1st, in large doses ; 2dly, in succession ; 3dly, in rotation ; and 4thly, by way of glyster, as well as by the mouth.

The jaw-fall in new-born infants is, I believe, always fatal. Purging off the meconium from the bowels immediately after birth has often prevented it from one of its causes ; and applying a rag wetted with spirit of turpentine to the navel-string, immediately after it is cut, Dr. Chisholm says, prevents it from another of its causes which has been mentioned. Dr. Dazille says it is prevented by the Indians, in the neighbourhood of Cayenne, by anointing their children daily, for nine days after their birth, with sweet oil.

This disease, I have said, sometimes affects horses. I have twice seen it cured by applying a potential caustic to the neck, under the mane, by large doses of the oil of amber, and by plunging one of them into a river, and throwing buckets of cold water upon the other. It was cured in the pidgeon formerly mentioned, by two grains of opium administered in the form of a pill.

I shall conclude my observations upon the tetanus with the following queries :

1. What would be the effects of *copious* blood-letting in this disease? There is a case upon record of its efficacy, in the Medical Journal of Paris, and I have now in my possession a letter from the late Dr. Hopkins of Connecticut, containing the history of a cure performed by it. Where tetanus is the effect of primary gout, hysteria, or fever, attended with highly inflammatory symptoms, bleeding is certainly indicated, in order to prevent the blood-vessels opposing their force to the action of tonics, and to place them in a minus or craving state of excitement. By means of this remedy employed *once* in the case of Mrs. Coates, at Kensington, and *twice* in the case of Miss Germon, in Swanson street, I was enabled to cure the disease in both of them. It was brought on by a corn in

the former, and by a wound in the latter instance. The blood of Miss Germon was very sizzly. In general, however, the disease is so completely insulated in the muscles, and the arteries are so far below their par of excitement in frequency and force, that little benefit can be expected from that remedy. The disease, in these cases, seems to call for an elevation, instead of a diminution, of the excitement of the blood-vessels. Perhaps bleeding *ad deliquium animi* might so far relax the muscles, as to enable the blood-vessels and other parts of the body to abstract from them their agreeable and natural portions of excitement. It is certain the muscles of a horse in a tetanus become relaxed the instant he dies. By inducing this relaxation, in the manner that has been mentioned, before the relations of the different systems of the body to each other are weakened and dissolved, it is possible the disease might be cured.

2. What would be the effect of *extreme* cold in this disease? Mr. John Hunter used to say, in his lectures, "Were he to be attacked by it, he would, if possible, fly to Nova-Zembla, or throw himself into an ice-house." I have no doubt of the efficacy of intense cold, in subduing the inordinate morbid actions which occur in the muscular system; but it offers so much violence to the

fears and prejudices of sick people, or their friends, that it can seldom be applied in such a manner as to derive much benefit from it. Perhaps the sedative effects of cold might be obtained with less difficulty, by wrapping the body in sheets, and wetting them occasionally for an hour or two with cold water.

3. What would be the effect of exciting a strong counter-action in the stomach and bowels in this disease? Dr. Brown of Kentucky cured a tetanus by inflaming the stomach, by means of the tincture of cantharides. It has likewise been cured by a severe cholera morbus, induced by a large dose of corrosive sublimate. The stomach and bowels, and the external muscles of the body, discover strong associations in many diseases. A sick stomach is always followed by general weakness, and the dry gripes often paralyse the muscles of the arms and limbs. But further, one of the remote causes of tetanus, viz. cold air, often shows the near relationship of the muscles to the bowels, and the vicarious nature of disease in each of them. It often produces in the latter, in the West Indies, what the French Physicians call a "*crampe seche*," or, in other words, if I may be allowed the expression, a tetanus in the bowels.

4. A sameness has been pointed out between many of the symptoms of hydrophobia and tetanus. A similar difficulty of swallowing, and similar convulsions after it, have been remarked in both diseases. Death often takes place suddenly in tetanus, as it does in hydrophobia, without producing marks of fatal disorganization in any of the internal parts of the body. Dr. Physick supposes death in these cases to be the effect of suffocation, from a sudden spasm and closure of the glottis, and proposes to prevent it in the same manner that he has proposed to prevent death from hydrophobia, that is, by laryngotomy.* The prospect of success from it appears alike reasonable in both cases.

* Medical Repository.

AN ACCOUNT
OF
THE DISEASE OCCASIONED
BY
DRINKING COLD WATER,
IN WARM WEATHER,
AND THE METHOD OF CURING IT.

AN ACCOUNT, &c.

FEW summers elapse in Philadelphia, in which there are not instances of many persons being diseased by drinking cold water. In some seasons, four or five persons have died suddenly from this cause in one day. This mortality falls chiefly upon the labouring part of the community, who seek to allay their thirst by drinking the water from the pumps in the streets, and who are too impatient, or too ignorant, to use the necessary precautions for preventing its morbid or deadly effects upon them. These accidents seldom happen, except when the mercury rises above 85° in Fahrenheit's thermometer.

Three circumstances generally concur to produce disease or death, from drinking cold water. 1. The patient is extremely warm. 2. The water is extremely cold. And 3. A large quantity of it is suddenly taken into the body. The danger from drinking the cold water is always in propor-

tion to the degrees of combination which occur in the three circumstances that have been mentioned.*

The following symptoms generally follow, where cold water has been taken, under the above circumstances, into the body :

In a few minutes after the patient has swallowed the water, he is affected by a dimness of sight ; he staggers, in attempting to walk, and unless supported, falls to the ground ; he breathes with difficulty ; a rattling is heard in his throat ; his nostrils and cheeks expand and contract in every act of respiration ; his face appears suffused with blood, and of a livid colour ; his extremities become cold, and his pulse imperceptible ; and, unless relief be speedily obtained, the disease terminates in death, in four or five minutes.

This description includes only the less common cases of the effects of drinking a *large* quantity of

* Dr. Currie has supposed, in his Medical Reports, that the persons who are thus affected by drinking cold water are in a state of debility, from the long continued action of heat upon their bodies ; but this is not the case. They are generally in a state of very high excitement. The Doctor's mistake is founded upon an erroneous belief, that the skin and the stomach possess a similar susceptibility to the action of cold water.

cold water, when the body is *preternaturally* heated. More frequently, patients are seized with acute spasms in the breast and stomach. These spasms are so painful as to produce syncope, and even asphyxia. They are sometimes of the tonic, but more frequently of the clonic kind. In the intervals of the spasms, the patient appears to be perfectly well. The intervals between each spasm become longer or shorter, according as the disease tends to life or death.

It may not be improper to take notice, that punch, beer, and even toddy, when drunken under the same circumstances as cold water, have all been known to produce the same morbid and fatal effects.

I know of but one certain remedy for this disease, and that is LIQUID LAUDANUM. The doses of it, as in other cases of spasm, should be proportioned to the violence of the disease. From a teaspoonful to near a table-spoonful have been given in some instances, before relief has been obtained. Where the powers of life appear to be suddenly suspended, the same remedies should be used, which have been so successfully employed in recovering persons supposed to be dead from drowning.

Care should be taken in every case of disease, or apparent death, from drinking cold water, to prevent the patient's suffering from being surrounded, or even attended, by too many people.

Persons who have been recovered from the immediate danger which attends this disease are sometimes affected, after it, by inflammations and obstructions in the breast or liver. These generally yield to the usual remedies which are administered in those complaints, when they arise from other causes.

If neither the voice of reason, nor the fatal examples of those who have perished from this cause, are sufficient to produce restraint in drinking a *large* quantity of *cold* liquors, when the body is *preternaturally* heated, then let me advise to

1. Grasp the vessel out of which you are about to drink for a minute or longer, with both your hands. This will abstract a portion of heat from the body, and impart it at the same time to the cold liquor, provided the vessel be made of metal, glass, or earth ; for heat follows the same laws, in many instances, in passing through bodies, with regard to its relative velocity, which we observe to take place in electricity.

2. If you are not furnished with a cup, and are obliged to drink by bringing your mouth in contact with the stream which issues from a pump, or a spring, always wash your hands and face, previously to your drinking, with a little of the cold water. By receiving the shock of the water first upon those parts of the body, a portion of its heat is conveyed away, and the vital parts are thereby defended from the action of the cold.

By the use of these preventives, inculcated by advertisements pasted upon pumps by the Humane Society, death from drinking cold water has become a rare occurrence for many years past in Philadelphia.

AN ACCOUNT
OF THE
CURE OF SEVERAL DISEASES,
BY THE
EXTRACTION OF DECAYED TEETH.

AN ACCOUNT, &c.

SOME time in the month of October, 1801, I attended Miss A. C. with a rheumatism in her hip joint, which yielded, for awhile, to the several remedies for that disease. In the month of November it returned with great violence, accompanied with a severe tooth-ache. Suspecting the rheumatic affection was excited by the pain in her tooth, which was decayed, I directed it to be extracted. The rheumatism immediately left her hip, and she recovered in a few days. She has continued ever since to be free from it.

Soon after this I was consulted by Mrs. J. R. who had been affected for several weeks with dyspepsia and tooth-ache. Her tooth, though no mark of decay appeared in it, was drawn by my advice. The next day she was relieved from her distressing stomach complaints, and has continued ever since to enjoy good health. From the soundness of the external part of the tooth, and the adjoining

gum, there was no reason to suspect a discharge of matter from it had produced the disease in her stomach.

Some time in the year 1801 I was consulted by the father of a young gentleman in Baltimore, who had been affected with epilepsy. I inquired into the state of his teeth, and was informed that several of them in his upper jaw were much decayed. I directed them to be extracted, and advised him afterwards to lose a few ounces of blood, at any time when he felt the premonitory symptoms of a recurrence of his fits. He followed my advice, in consequence of which I had lately the pleasure of hearing from his brother that he was perfectly cured.

I have been made happy by discovering that I have only added to the observations of other physicians, in pointing out a connexion between the extraction of decayed and diseased teeth and the cure of general diseases. Several cases of the efficacy of that remedy in relieving head-ache and vertigo are mentioned by Dr. Darwin. Dr. Gater relates that Mr. Pettit, a celebrated French surgeon, had often cured intermitting fevers, which had resisted the bark for months, and even years, by this prescription ; and he quotes from his works

two cases, the one of consumption, the other of vertigo, both of long continuance, which were suddenly cured by the extraction of two decayed teeth in the former, and of two supernumerary teeth in the latter case.*

In the second number of a late work, entitled, "Bibliothèque Germanique Medico Chirurgicale," published in Paris, by Dr. Bluver and Dr. Delaroché, there is an account, by Dr. Siebold, of a young woman who had been affected for several months with great inflammation, pain and ulcers, in her right upper and lower jaws, at the usual time of the appearance of the catamenia, which at that period were always deficient in quantity. Upon inspecting the seats of those morbid affections, the Doctor discovered several of the *molares* in both jaws to be decayed. He directed them to be drawn, in consequence of which the woman was relieved of the monthly disease in her mouth, and afterwards had a regular discharge of her catamenia.

These facts, though but little attended to, should not surprise us, when we recollect how often the

* Recherches sur differens points de Physiologie de Pathologie et de Therapeutique, p. 353, 354.

most distressing general diseases are brought on by very inconsiderable inlets of morbid excitement into the system. A small tumour, concealed in a fleshy part of the leg, has been known to bring on epilepsy. A trifling wound with a splinter or a nail, even after it has healed, has often induced a fatal tetanus. Worms in the bowels have produced internal dropsy of the brain, and a stone in the kidney has excited the most violent commotions in every part of the system. Many hundred facts of a similar nature are to be met with in the records of medicine.

When we consider how often the teeth, when decayed, are exposed to irritation from hot and cold drinks and aliments, from pressure by mastication, and from the cold air, and how intimate the connection of the mouth is with the whole system, I am disposed to believe they are often the unsuspected causes of general, and particularly of nervous diseases. When we add to the list of those diseases the morbid effects of the acrid and putrid matters which are sometimes discharged from caries teeth, or from ulcers in the gums created by them, also the influence which both have in preventing perfect mastication, and the connection of that animal function with good health, I cannot help thinking that our success in the treatment of

all chronic diseases would be very much promoted, by directing our inquiries into the state of the teeth in sick people, and by advising their extraction in every case in which they are decayed. It is not necessary that they should be attended with pain, in order to produce diseases, for splinters, tumours, and other irritants before mentioned, often bring on disease and death, when they give no pain, and are unsuspected as causes of them. This translation of sensation and motion to parts remote from the place where impressions are made appears in many instances, and seems to depend upon an original law of the animal economy.

OBSERVATIONS

UPON

WORMS IN THE ALIMENTARY CANALS,

AND UPON

ANTHELMINTIC MEDICINES.

OBSERVATIONS, &c.

WITH great diffidence I venture to lay before the public my opinions upon worms ; nor should I have presumed to do it, had I not entertained a hope of thereby exciting further inquiries upon this subject.

When we consider how universally worms are found in all young animals, and how frequently they exist in the human body, without producing disease of any kind, it is natural to conclude, that they serve some useful and necessary purposes in the animal economy. Do they consume the superfluous aliment which all young animals are disposed to take, before they have been taught, by experience or reason, the bad consequences which arise from it ? It is no objection to this opinion, that worms are unknown in the human body in

some countries. The laws of nature are diversified, and often suspended under peculiar circumstances in many cases, where the departure from uniformity is still more unaccountable than in the present instance. Do worms produce diseases from an *excess* in their *number*, and an *error* in their place, in the same manner that blood, bile, and air produce diseases from an *error* in their place, or from *excess* in their *quantities*? Before these questions are decided, I shall mention a few facts, which have been the result of my own observations upon this subject.

1. In many instances, I have seen worms discharged in the small-pox and measles, from children who were in perfect health previously to their being attacked by those diseases, and who never before discovered a single symptom of worms. I shall say nothing here of the swarms of worms which are discharged in fevers of all kinds, until I attempt to prove that an idiopathic fever is never produced by worms.

2. Nine out of ten of the cases which I have seen of worms, have been in children of the grossest habits and most vigorous constitutions. This is more especially the case, where the worms are dislodged by the small-pox and measles. Doctor

Capelle of Wilmington, in a letter which I received from him, informed me, that in the livers of sixteen, out of eighteen rats which he dissected, he found a number of the *tænia* worms. The rats were fat, and appeared in other respects to have been in perfect health. The two rats in which he found no worms, he says, “ were very lean, and “ their livers smaller in proportion than the others.”

3. In weakly children, I have often known the most powerful anthelmintics given without bringing away a single worm. If these medicines have afforded any relief, it has been by their tonic quality. From this fact, is it not probable—the conjecture, I am afraid, is too bold, but I will risk it : —is it not probable, I say, that children are sometimes disordered from the want of worms? Perhaps the tonic medicines which have been mentioned render the bowels a more quiet and comfortable asylum for them, and thereby provide the system with the means of obviating the effects of crapulas, to which all children are disposed. It is in this way that nature, in many instances, cures evil by evil. I confine the salutary office of worms only to that species of them which is known by the name of the round worm, and which occurs most frequently in children.

Is there any such disease as an idiopathic worm-fever? The Indians in this country say there is not, and ascribe the discharge of worms to a fever, and not a fever to the worms.*

By adopting this opinion, I am aware that I contradict the observations of many eminent and respectable physicians.

Doctor Huxham describes an epidemic pleurisy, in the month of March, in the year 1740, which he supposes was produced by his patients feeding upon some corn that had been injured by the rain the August before.† He likewise mentions that a number of people, and those too of the elderly sort,‡ were afflicted at one time with worms, in the month of April, in the year 1743.

Lieuteaud gives an account of an epidemic worm fever from Velchius, an Italian physician;|| and Sauvages describes, from Vandermonde, an epidemic dysentery from worms, which yielded finally only to worm medicines.§ Sir John Pringle, and

* See the Inquiry into the Diseases of the Indians.

† Vol. ii. of his Epidemics, p. 56.

‡ P. 136.

Vol. i. p. 76.

§ Vol. ii. p. 329.

Doctor Monro, likewise, frequently mention worms as accompanying the dysentery and remitting fever, and recommend the use of calomel as an antidote to them.

I grant that worms appear more frequently in some epidemic diseases than in others, and oftener in some years than in others. But may not the same heat, moisture, and diet, which produced the diseases, have produced the worms? And may not their discharge from the bowels have been occasioned in those epidemics, as in the small-pox and measles, by the increased heat of the body, by the want of nourishment, or by an anthelmintic quality being accidentally combined with some of the medicines that are usually given in fevers?

In answer to this, we are told that we often see the crisis of a fever brought on by the discharge of worms from the bowels by means of a purge, or by an anthelmintic medicine. Whenever this is the case, I believe it is occasioned by offending bile being dislodged by means of the purge, at the same time with the worms, or by the anthelmintic medicine (if not a purge) having been given on, or near, one of the usual critical days of the fever. What makes the latter supposition probable is, that worms are seldom suspected in the beginning

of fevers, and anthelmintic medicines seldom given, till every other remedy has failed of success ; and this generally happens about the usual time in which fevers terminate in life or death.

It is very remarkable, that since the discovery and description of the hydrocephalus internus we hear and read much less than formerly of worm-fevers. I suspect that disease of the brain has laid the foundation for the principal part of the cases of worm-fevers, which are upon record in books of medicine. I grant that worms sometimes increase the danger from fevers, and often confound the diagnosis and prognosis of them, by a number of new and anomalous symptoms. But here we see nothing more than that complication of symptoms, which often occurs in diseases of a very different and opposite nature.

Having rejected worms as the cause of fevers, I proceed to remark, that the diseases most commonly produced by them belong to Dr. Cullen's class of NEUROSES. And here I might add, that there is scarcely a disease, or symptom of a disease, belonging to this class, which is not produced by worms. It would be only publishing extracts from books, to describe them.

The *chronic* and *nervous* diseases of children, which are so numerous, and frequently fatal, are, I believe, frequently occasioned by worms. There is no great danger, therefore, of doing mischief, by prescribing anthelmintic medicines in all our first attempts to cure their chronic and nervous diseases.

I have been much gratified by finding myself supported in the above theory of worm-fevers, by the late Dr. William Hunter, and by Dr. Butter, in his excellent treatise upon the infantile remitting fever.

I have taken great pains to find out, whether the presence of the different species of worms might not be discovered by certain peculiar symptoms : but all to no purpose. I once attended a girl of twelve years of age in a fever, who discharged four yards of a *tænia*, and who was so far from having discovered any peculiar symptom of this species of worms, that she had never complained of any other indisposition, than now and then a slight pain in the stomach, which often occurs in young girls from a sedentary life, or from errors in their diet. I beg leave to add further, that there is not a symptom which has been said to indicate the presence of worms of any kind, as the cause of a disease, that has not deceived me ; and none oftener

than the one that has been so much depended upon, viz. the picking of the nose. A discharge of worms from the bowels is, perhaps, the only symptom that is pathognomonic of their presence in the intestines.

I shall now make a few remarks upon anthelmintic remedies.

But I shall first give an account of some experiments which I made in the year 1771, upon the common earth-worm, in order to ascertain the anthelmintic virtues of a variety of substances. I made choice of the earth-worm for this purpose, as it is, according to naturalists, nearly the same in its structure, manner of subsistence, and mode of propagating its species, with the round worm of the human body.

In the first column I shall set down, under distinct heads, the substances in which worms were placed; and in the second and third columns the *time* of their death, from the action of these substances upon them.

I. BITER AND ASTRINGENT SUBSTANCES.	Hours.	Minutes.
Watery infusion of aloes	2	48
———— of rhubarb	1	30
———— of Peruvian bark	1	30
II. PURGES.		
Watery infusion of Jalap	1	—
———— bear's-foot	1	17
———— gamboge	1	—
III. SALTS.		
1. <i>Acids.</i>		
Vinegar	—	1½ convulsed.
Lime juice	—	1
Diluted nitrous acid	—	1½
2. <i>Alkali.</i>		
A watery solution of salt of tartar	—	2 convulsed, throwing up a mucus on the surface of the water.
3. <i>Neutral Salts.</i>		
In a watery solution of common salt	—	1 convulsed.
———— of nitre	—	ditto.
———— of sal diuretic	—	ditto.
———— of sal ammoniac	—	1½
———— of common salt and sugar	—	4
4. <i>Earthy and metallic salts.</i>		
In a watery solution of Epsom salt	—	15½
———— of rock alum	—	10
———— of corrosive sublimate	—	1½ convulsed.
———— of calomel	—	49
———— of turpeth mineral	—	1 convulsed.
———— of sugar of lead	—	3
———— of green vitriol	—	1
———— of blue vitriol	—	10
———— of white vitriol	—	30

IV. METALS.		Hours.	Minutes.
Filings of steel	—	—	25½
Filings of tin	—	1	—
V. CALCAREOUS EARTH.			
Chalk.	—	2	—
VI. NARCOTIC SUBSTANCES.			
Watery infusion of opium	—	—	11½ convulsed.
— of Carolina pink-root	—	—	33
— of tobacco	—	—	14
VII. ESSENTIAL OILS.			
Oil of Wormwood	—	—	3 convulsed.
— of mint	—	—	3
— of caraway seed	—	—	3
— of amber	—	—	1½
— of anniseed	—	—	4½
— of turpentine	—	—	6
VIII. ARSENIC.			
A watery solution of white arsenic	near	2	—
IX. FERMENTED LIQUORS.			
In Madeira wine	—	—	3 convulsed.
Claret	—	—	10
X. DISTILLED SPIRITS.			
Common rum	—	—	1 convulsed.
XI. THE FRESH JUICES OF RIPE FRUITS.			
The juice of red cherries	—	—	5½
— of black do.	—	—	5
— of red currants	—	—	2½
— of gooseberries	—	—	3½
— of wortleberries	—	—	12
— of blackberries	—	—	7
— of raspberries	—	—	5½
— of plums	—	—	13
— of peaches	—	—	25

The juice of water-melons, no effect	Hours.	Minutes.
	—	—
XII. SACCHARINE SUBSTANCES.		
Honey	—	7
Molasses	—	7
Brown sugar	—	30
Manna	—	2 $\frac{1}{2}$
XIII. IN AROMATIC SUBSTANCES.		
Camphor	—	5
Pimento	—	3 $\frac{1}{2}$
Black pepper	—	45
XIV. FOETID SUBSTANCES.		
Juice of onions	—	3 $\frac{1}{2}$
Watery infusion of assafoetida	—	27
——— Santonicum, or worm seed	1	—
XV. MISCELLANEOUS SUBSTANCES.		
Sulphur mixed with oil	2	—
Æthiops mineral	2	—
Sulphur	2	—
Solution of gunpowder	—	1 $\frac{1}{2}$
——— of soap	—	19
Oxymel of squills	—	3 $\frac{1}{2}$
Sweet oil	2	30

In the application of these experiments to the human body, an allowance must always be made for the alteration which the several anthelmintic substances that have been mentioned may undergo, from mixture and diffusion, in the stomach and bowels.

In order to derive any benefit from these expe-

riments, as well as from the observations that have been made upon anthelmintic medicines, it will be necessary to divide them into such as act,

1. Mechanically,
2. Chemically, upon worms; and,
3. Into those which possess a power composed of chemical and mechanical qualities.

1. The mechanical medicines act indirectly and directly upon the worms.

Those which act *indirectly* are, vomits, purges, bitter and astringent substances, particularly aloes, rhubarb, bark, bear's-foot, and worm seed. Sweet oil acts indirectly and very feebly upon worms. It was introduced into medicine from its efficacy in destroying the botts in horses ; but the worms which infest the human bowels are of a different nature, and possess very different organs of life, from those which are found in the stomach of a horse.

Those mechanical medicines which act *directly* upon the worms, are cowhage* and powder of tin.

* *Dolichos Pruriens*, of Linnæus.

The last of these medicines has been supposed to act chemically upon the worms, from the arsenic which adheres to it ; but from the length of time a worm lived in a solution of white arsenic, it is probable the tin acts altogether mechanically upon them.

2. The medicines which act chemically upon worms appear, from our experiments, to be very numerous.

Nature has wisely guarded children against the morbid effects of worms, by implanting in them an early appetite for common salt, ripe fruits, and saccharine substances ; all of which appear to be among the most speedy and effectual poisons for worms.

Let it not be said, that nature here counteracts her own purposes. Her conduct in this business is conformable to many of her operations in the human body, as well as throughout all her works. The bile is a necessary part of the animal fluids, and yet an appetite for ripe fruits seems to be implanted, chiefly to obviate the consequences of its excess, or acrimony, in the summer and autumnal months.

The use of common salt as an anthelmintic medicine is both ancient and universal. Celsus recommends it. In Ireland it is a common practice to feed children, who are afflicted by worms, for a week or two upon a salt sea-weed, and when the bowels are well charged with it, to give a purge of wort in order to carry off the worms, after they are debilitated by the salt diet.

I have administered many pounds of common salt coloured with cochineal, in doses of half a drachm, upon an empty stomach in the morning, with great success in destroying worms.

Ever since I observed the effects of sugar and other sweet substances upon worms, I have recommended the liberal use of all of them in the diet of children, with the happiest effects. The sweet substances probably act in preventing the diseases from worms in the stomach only, into which they often insinuate themselves, especially in the morning. When we wish to dislodge worms from the bowels by sugar or molasses, we must give these substances in large quantities, so that they may escape in part the action of the stomach upon them.

I can say nothing from my own experience of the efficacy of the mineral salts, composed of cop-

per, iron, and zinc, combined with vitriolic acid, in destroying worms in the bowels. Nor have I ever used the corrosive sublimate in small doses as an anthelmintic.

I have¹ heard of well-attested cases of the efficacy of the oil of turpentine in destroying worms.

The expressed juices of onions and of garlic are very common remedies for worms. From one of the experiments, it appears that the onion juice possesses strong anthelmintic virtues.

I have often prescribed a tea-spoonful of gunpowder in the morning, upon an empty stomach, with obvious advantage. The active medicine here is probably the nitre,

I have found a syrup made of the bark of the Jamaica cabbage-tree* to be a powerful, as well as a most agreeable anthelmintic medicine. It sometimes purges and vomits, but its good effects may be obtained, without giving it in such doses as to produce these evacuations.

* *Geoffrea*, of Linnæus.

There is not a more *certain* anthelmintic than Carolina pink-root.* But as there have been instances of death having followed excessive doses of it, imprudently administered, and as children are often affected by giddiness, stupor, and a redness and pain in the eyes, after taking it, I acknowledge that I have generally preferred to it less certain, but more safe, medicines for destroying worms.

3. Of the medicines whose action is compounded of mechanical and chemical qualities, calomel, jalap, and the powder of steel, are the principal.

Calomel, in order to be effectual, must be given in large doses. It is a safe and powerful anthelmintic. Combined with jalap, it often brings away worms when given for other purposes.

Of all the medicines that I have administered, I know of none more safe and certain than the simple preparations of iron, whether they be given in the form of steel-filings, or of the rust of iron. If ever they fail of success, it is because they are given in too small doses. I generally prescribe from five to thirty grains, every morning, to children between one year and ten years old; and I

* *Spigelia Marylandica*, of Linnæus.

have been taught by an old sea-captain, who was cured of a tænia by this medicine, to give from two drachms to half an ounce of it, every morning, for three or four days, not only with safety, but with success.

I shall conclude this essay with the following remarks :

1. Where the action of medicines upon worms in the bowels does not agree exactly with their action upon the earth-worms, in the experiments that have been related, it must be ascribed to the medicines being more or less altered by the action of the stomach upon them. I conceive that the superior anthelmintic qualities of pink-root, steel-filings, and calomel (all of which acted but slowly upon the earth-worms compared with many other substances) are in a great degree occasioned by their escaping the digestive powers unchanged, and acting in a concentrated state upon the worms.

2. In fevers attended with anomalous symptoms, which are supposed to arise from worms, I have constantly refused to yield to the solicitations of my patients, to abandon the indications of cure in the fever, and to pursue worms as the *principal* cause of the disease. While I have adhered stea-

dily to the usual remedies for the different states of fever, in all their stages, I have at the same time blended those remedies occasionally with anthelmintic medicines. In this I have imitated the practice of physicians in many other diseases, in which troublesome and dangerous symptoms are pursued, without seducing the attention from the original disease. The anthelmintic medicines prescribed in these cases should not be the rust of iron, and common salt, which are so very useful in chronic diseases from worms, but calomel and jalap, and such other medicines as aid in the cure of fevers.

AN ACCOUNT

OF THE

EXTERNAL USE OF ARSENIC,

IN THE

CURE OF CANCERS.

AN ACCOUNT, &c.

A FEW years ago, a certain Doctor Hugh Martin, a surgeon of one of the Pennsylvania regiments stationed at Pittsburg, during the latter part of the late war, came to this city, and advertised to cure cancers with a medicine which he said he had discovered in the woods, in the neighbourhood of the garrison. As Dr. Martin had once been my pupil, I took the liberty of waiting upon him, and asked him some questions respecting his discovery. His answers were calculated to make me believe, that his medicine was of a vegetable nature, and that it was originally an Indian remedy. He showed me some of the medicine, which appeared to be the powder of a well-dried root of some kind. Anxious to see the success of this medicine in cancerous sores, I prevailed upon the Doctor to admit me to see him apply it in two or

three cases. I observed, in some instances, he applied a powder to the parts affected, and in others only touched them with a feather dipped in a liquid which had a white sediment, and which he made me believe was the vegetable root diffused in water. It gave me great pleasure to witness the efficacy of the Doctor's applications. In several cancerous ulcers, the cures he performed were complete. Where the cancers were much connected with the lymphatic system, or accompanied with a scrophulous habit of body, his medicine always failed, and, in some instances, did evident mischief.

Anxious to discover a medicine that promised relief in even a few cases of cancers, and supposing that all the caustic vegetables were nearly alike, I applied the phytolacca or poke-root, the stramonium, the arum, and one or two others, to foul ulcers, in hopes of seeing the same effects from them which I had seen from Doctor Martin's powder; but in these I was disappointed. They gave some pain, but performed no cures. At length I was furnished by a gentleman from Pittsburg with a powder which I had no doubt, from a variety of circumstances, was of the same kind as that used by Dr. Martin. I applied it to a fungous ulcer, but without producing the de-

grees of pain, inflammation, or discharge, which I had been accustomed to see from the application of Dr. Martin's powder. After this, I should have suspected that the powder was not a *simple* root, had not the Doctor continued upon all occasions to assure me, that it was wholly a vegetable preparation.

In the beginning of the year 1784, the Doctor died, and it was generally believed that his medicine had died with him. A few weeks after his death I procured, from one of his administrators, a few ounces of the Doctor's powder, partly with a view of applying it to a cancerous sore which then offered, and partly with a view of examining it more minutely than I had been able to do during the Doctor's life. Upon throwing the powder, which was of a brown colour, upon a piece of white paper, I perceived distinctly a number of white particles scattered through it. I suspected at first that they were corrosive sublimate, but the usual tests of that metallic salt soon convinced me that I was mistaken. Recollecting that arsenic was the basis of most of the celebrated cancer powders that have been used in the world, I had recourse to the tests for detecting it. Upon sprinkling a small quantity of the powder upon some coals of fire, it emitted the garlick smell so per-

ceptibly as to be known by several persons whom I called into the room where I made the experiment, and who knew nothing of the object of my inquiries. After this, with some difficulty, I picked out about three or four grains of the white powder, and bound them between two pieces of copper, which I threw into the fire. After the copper pieces became red hot, I took them out of the fire, and when they had cooled, discovered an evident whiteness imparted to both of them. One of the pieces afterwards looked like dull silver. These two tests have generally been thought sufficient to distinguish the presence of arsenic in any bodies; but I made use of a third, which has lately been communicated to the world by Mr. Bergman, and which is supposed to be in all cases infallible.

I infused a small quantity of the powder in a solution of a vegetable alkali in water for a few hours, and then poured it upon a solution of blue vitriol in water. The colour of the vitriol was immediately changed to a beautiful green, and afterwards precipitated.

I shall close this paper with a few remarks upon this powder, and upon the cure of cancers and foul ulcers of all kinds.

1. The use of caustics in cancers and foul ulcers is very ancient, and universal. But I believe *arsenic* to be the most efficacious of any that has ever been used. It is the basis of Plunket's and probably of Guy's well-known cancer powders. The great art of applying it successfully, is to dilute and mix it in such a manner as to mitigate the violence of its action. Doctor Martin's composition was happily calculated for this purpose. It gave less pain than the common or lunar caustic. It excited a moderate inflammation, which separated the morbid from the sound parts, and promoted a plentiful afflux of humours to the sore during its application. It seldom produced an eschar; hence it insinuated itself into the deepest recesses of the cancers, and frequently separated those fibres in an unbroken state, which are generally called the roots of the cancer. Upon this account, I think, in some ulcerated cancers it is to be preferred to the knife. It has no action upon the sound skin. This Doctor Hall proved, by confining a small quantity of it upon his arm for many hours. In those cases where Doctor Martin used it to extract cancerous or schirrous tumours that were not ulcerated, I have reason to believe that he always broke the skin with Spanish flies.

2. The arsenic used by the Doctor was the pure white arsenic. I should suppose from the examination I made of the powder with the eye, that the proportion of arsenic to the vegetable powder, could not be more than one-fortieth part of the whole compound. I have reason to think that the Doctor employed different vegetable substances at different times. The vegetable matter with which the arsenic was combined in the powder which I used in my experiments, was probably nothing more than the powder of the root and berries of the *solanum lethale*, or deadly nightshade. As the principal, and perhaps the only design of the vegetable addition was to blunt the activity of the arsenic, I should suppose that the same proportion of common wheat flour as the Doctor used of his caustic vegetables, would answer nearly the same purpose. In those cases where the Doctor applied a feather dipped in a liquid to the sore of his patient, I have no doubt but his phial contained nothing but a weak solution of arsenic in water. This is no new method of applying arsenic to foul ulcers. Doctor Way, of Wilmington, has spoken in the highest terms to me of a wash for foulnesses on the skin, as well as old ulcers, prepared by boiling an ounce of white arsenic in two quarts of water to three pints, and applying it once or twice a day

3. I mentioned, formerly, that Doctor Martin was often unsuccessful in the application of his powder. This was occasioned by his using it indiscriminately in *all* cases. In schirrous and cancerous tumours, the knife should always be preferred to the caustic. In cancerous ulcers attended with a scrophulous or a bad habit of body, such particularly as have their seat in the neck, in the breasts of females, and in the axiliary glands, it can only protract the patient's misery. Most of the cancerous sores cured by Doctor Martin were seated on the nose, or cheeks, or upon the surface or extremities of the body. It remains yet to discover a cure for cancers that taint the fluids, or infect the whole lymphatic system. This cure I apprehend must be sought for in diet, or in the long use of some internal medicine.

To pronounce a disease incurable, is often to render it so. The intermitting fever, if left to itself, would probably prove frequently, and perhaps more speedily fatal than cancers. And as cancerous tumours and sores are often neglected, or treated improperly by injudicious people, from an apprehension that they are incurable (to which the frequent advice of physicians "to let them alone," has no doubt contributed) perhaps the introduction of arsenic into regular practice as a

remedy for cancers, may invite to a more early application to physicians, and thereby prevent the deplorable cases that have been mentioned, which are often rendered so by delay or unskilful management.

4. It is not in cancerous sores only that Doctor Martin's powder has been found to do service. In sores of all kinds, and from a variety of causes, where they have been attended with fungous flesh or callous edges, I have used the Doctor's powder with advantage.

I flatter myself that I shall be excused in giving this detail of a *quack* medicine, when we reflect that it was from the inventions and temerity of quacks, that physicians have derived some of their most active and useful medicines.

AN INQUIRY

INTO THE

CAUSE AND CURE OF SORE LEGS.

VOL. I.

3 C

AN INQUIRY, &c.

HOWEVER trifling these complaints may appear, they compose a large class of the diseases of a numerous body of people. Hitherto, the persons afflicted by them have been too generally abandoned to the care of empirics, either because the disease was considered as beneath the notice of physicians, or because they were unable to cure it. I would rather ascribe it to the latter, than to the former cause, for pride has no natural fellowship with the profession of medicine.

The difficulty of curing sore legs has been confessed by physicians in every country. As far as my observations have extended, I am disposed to ascribe this difficulty to the uniform and indiscriminate mode of treating them, occasioned by the want of a theory which shall explain their proxi-

mate cause. I shall attempt in a few pages to deliver one, which, however imperfect, will, I hope, lay a foundation for more successful inquiries upon this subject hereafter.

I shall begin my observations upon this disease, by delivering and supporting the following propositions.

I. SORE LEGS are induced by general debility. This I infer from the occupations and habits of the persons who are most subject to them. They are day-labourers, and sailors, who are in the habit of lifting great weights ; also washer-women, and all other persons, who pass the greatest part of their time upon their feet. The blood-vessels and muscular fibres of the legs are thus overstretched, by which means either a rupture, or such a languid action in the vessels, is induced, as that an accidental wound from any cause, even from the scratch of a pin, or the bite of a mosquito, will not easily heal. But labourers, sailors, and washer-women, are not the only persons who are afflicted with sore legs. Hard drinkers of every rank and description are likewise subject to them. Where strong drink, labour, and standing long on the feet are united, they more certainly dispose to sore legs, than when they act separately. In China, where

the labour which is performed by brutes in other countries is performed by men, varices on the legs are very common among the labouring people. Perhaps, the reason why the debility induced in the legs produces varices instead of ulcers in these people, may be owing to their not adding the debilitating stimulus of strong drink to that of excessive labour.

It is not extraordinary that the debility produced by intemperance in drinking ardent spirits should appear first in the lower extremities. The debility produced by intemperance in the use of wine makes its first appearance in the form of gout, in the same part of the body. The gout, it is true, discovers itself most frequently in pain only, but there are cases in which it has terminated in ulcers, and even mortifications on the legs.

II. Sore legs are connected with a morbid state of the whole system. This I infer,

1. From the causes which induce them, all of which act more or less upon every part of the body.

2. From their following or preceding diseases, which obviously belong to the whole system: Fevers and dysenteries often terminate critically in

this disease ; and the pulmonary consumption and apoplexy have often been preceded by the suppression of a habitual discharge from a sore leg. The two latter diseases have been ascribed to the translation of a morbid matter to the lungs or brain : but it is more rational to ascribe them to a previous debility in those organs by which means their vessels were more easily excited into action and effusion by the stimulus of the plethora, induced upon the system in consequence of the confinement of the fluids formerly discharged from the leg, in the form of pus. This plethora can do harm only where there is previous debility; for I maintain that the system (when the solids are exactly toned) will always relieve itself of a sudden preternatural accumulation of fluids by means of some natural emunctory. This has been often observed in the menorrhagia, which accompanies plentiful living in women, and in the copious discharges from the bowels and kidneys, which follow a suppression of the perspiration.

3. I infer it, from their appearing almost universally in one disease, which is evidently a disease of the whole system, viz. the scurvy.

4. From their becoming in some cases the outlets of menstrual blood, which is discharged in con-

sequence of a plethora, which affects more or less every part of the female system.

5. I infer it from the *symptoms* of sore legs, which are in some cases febrile, and affect the pulse in every part of the body with preternatural frequency or force. These symptoms were witnessed, in an eminent degree, in two of the patients who furnished subjects for clinical remarks in the Pennsylvania hospital some years ago.

6. I infer that sore legs are a disease of the whole system, from the manner in which they are sometimes cured by nature and art. They often prove the outlets of many general diseases, and all the remedies which cure them act more or less upon the whole system.

In all cases of sore legs there is a tonic and atonic state of the whole system. The same state of excessive or weak morbid action takes place in the parts which are affected by the sores. The remedies to cure them, therefore, should be *general* and *local*.

In cases where the arterial system is affected by too much tone, the general remedies should be,

I. BLOOD-LETTING. Of the efficacy of this remedy in disposing ulcers suddenly to heal, the two clinical patients before-mentioned exhibited remarkable proofs, in the presence of all the students of medicine in the university. The blood drawn was sized in both cases. I have not the merit of having introduced this remedy into practice in the cure of ulcers. I learned it from Sir John Pringle. I have known it to be used with equal success in a sore breast, attended by pain and inflammation, after all the usual remedies in that disease had been used to no purpose.

II. GENTLE PURGES.

III. NITRE. From fifteen to twenty grains of this medicine should be given three times a-day.

IV. A TEMPERATE DIET, and a total abstinence from fermented and distilled liquors.

V. COOL and PURE AIR.

VI. REST, in a recumbent posture of the body.

The *local* remedies in this state of the system should be,

I. Cold water. Dr. Rigby has written largely in favour of this remedy, when applied to local inflammations. From its good effects in allaying the inflammation, which sometimes follows the puncture which is made in the arm in communicating the small-pox, and from the sudden relief it affords in the inflammatory state of the ophthalmia and in the piles, no one can doubt of its efficacy in sore legs, accompanied by inflammation in those vessels which are the immediate seat of the disease.

II. Soft poultices of bread and milk, or of bread moistened with lead water. Dr. Underwood's method of making a poultice of bread and milk should be preferred in this case. He directs us first to boil the milk, then to powder the bread, and throw it into the milk, and after they have been intimately mixed, by being well stirred and boiled together, they should be poured out and spread upon a rag, and a knife dipped in sweet oil or lard should be run over them. The solidity and consistence of the poultice is hereby better preserved, than when the oil or lard is mixed with the bread and milk over the fire.

III. When the inflammation subsides, adhesive plaisters so applied as to draw the sound edges of the sores together. This remedy has been used

with great success by Dr. Physic, in the Pennsylvania hospital, and in his private practice.

IV. Above all, rest, and a horizontal posture of the leg. Too much cannot be said in favour of this remedy in this species of sore legs. Nannoni, the famous Italian surgeon, sums up the cure of sore legs in three words, viz. “Tempo, riposo, e pazienza;” that is, in time, rest, and patience. A friend of mine, who was cured by this surgeon of a sore leg, many years ago, informed me, that he confined him to his bed during the greatest part of the time that he was under his care.

In sore legs, attended by too little general and local action, the following remedies are proper.

I. BARK. It should be used plentifully, but with a constant reference to the state of the system; for the changes in the weather, and other accidental circumstances, often produce such changes in the system, as to render its disuse for a short time frequently necessary.

II. MERCURY. This remedy has been supposed to act by altering the fluids, or by discharging a morbid matter from them, in curing sore legs. But this is by no means the case. It appears to act as

a universal stimulant; and if it prove most useful when it excites a salivation, it is only because in this way it excites the most general action in the system.

III. MINERAL TONICS, such as the different preparations of iron, copper, and zinc.

IV. GENTLE EXERCISE. Rest, and a recumbent posture of the body, so proper in the tonic, are both hurtful in this species of sore legs. The efficacy of exercise, even of the active kind, in the cure of sore legs, accompanied by deficient action in the vessels, may easily be conceived from its good effects after gun-shot wounds, which are mentioned by Dr. Jackson.* He tells us, that those British soldiers who had been wounded at the battle of Guilford, in North Carolina, who were turned out of the military hospitals and followed the army, soonest recovered of their wounds. It was remarkable, that if they delayed only a few days on the road, their wounds grew worse, or ceased to heal.

In the use of the different species of exercise, the same regard should be had to the state of

* Medical Journal, 1790.

the system, which has been recommended in other diseases.

V. A nutritious and moderately stimulating diet, consisting of milk, saccharine vegetables, animal food, malt liquors, and wine.

Wort has done great service in sore legs. The manner in which I have directed it to be prepared and taken is as follows : To three or four heaped table-spoonsful of the malt, finely powdered and sifted, add two table-spoonsful of brown sugar, and three or four of Madeira, sherry, or Lisbon wine, and a quart of boiling water. After they have stood a few hours, it may be drunken liberally by the patient, stirring it each time before he takes it, so that the whole substance of the malt may be conveyed into the stomach. A little lime-juice may be added, if the patient requires it, to make it more pleasant. The above quantity may be taken once, twice, or three times a-day, at the pleasure of the patient, or according to the indication of his disease.

VI. OPIUM. This remedy is not only useful in easing the pain of a sore leg, but co-operates with other cordial medicines in invigorating the whole system.

VII. Baglivi says that in Rome, and Dr. Cleg-horn tells us that in Minorca, ulcers of the legs are “almost incurable.” It is probable there are many parts of the world in which the air has the same unfriendly influence upon this disease. In such cases it will be proper to advise a change of climate.

The *local* applications should consist of such substances as are gently escarotic, and which excite an action in the torpid vessels of the affected part. Arsenic, precipitate, and blue vitriol, have all been employed with success for this purpose. Dr. Griffiths informed me, that he has frequently accomplished the same thing in the dispensary by applications of tartar emetic. They should all be used, if necessary, in succession to each other; for there is often the same idiosyncrasy in a sore leg to certain topical applications, that there is in the stomach to certain aliments. After the use of these remedies, astringents and tonics should be applied, such as an infusion of Peruvian, or white-oak bark, the water in which the smiths extinguish their irons, lime-water, bread dipped in a weak solution of green vitriol (so much commended by Dr. Underwood) compresses wetted with brandy, or ardent spirits of any kind, and, above all, the adhesive plaisters formerly mentioned.

Tight bandages are likewise highly proper here. The laced stocking has been much used. It is made of strong coarse linen. Dr. Underwood gives several good reasons for preferring a flannel roller to the linen stocking. It sets easier on the leg, and yields to the swelling of the muscles in walking.

In scorbutic sores on the legs, navy surgeons have spoken in high terms of an application of a mixture of lime-juice and molasses. Mr. Gillespie commends the use of lime or lemon-juice alone, and ascribes many cures to it in the British navy during the late war, after every common application had been used to no purpose.*

It is of the utmost consequence, in the treatment of sore legs, to keep them clean, by frequent dressings and washings. The success of old women is oftener derived from their great attention to cleanliness, in the management of sore legs, than to any specifics they possess which are unknown to physicians.

When sore legs are kept from healing by affections of the bone, the treatment should be such as is recommended by practical writers on surgery.

* Medical Journal, vol. vi.

I shall conclude this inquiry by four observations, which are naturally suggested by what has been delivered upon this disease.

1. If it has been proved that sore legs are connected with a morbid state of the whole system, is it not proper to inquire, whether many other diseases, supposed to be local, are not in like manner connected with the whole system ; and if sore legs have been cured by general remedies, is it not proper to use them more frequently in local diseases ?

2. If there be two states of action in the arteries in sore legs, it becomes us to inquire, whether the same opposite states of action do not take place in many diseases, in which they are not suspected. It would be easy to prove, that they exist in several other local diseases.

3. If the efficacy of the remedies for sore legs, which have been mentioned, depend upon their being accommodated exactly to the state of the arterial system, and if this system be liable to frequent changes, does it not become us to be more attentive to the state of the pulse in this disease, than is commonly supposed to be necessary by physicians ?

4. It has been a misfortune in medicine, as well as in other sciences, for men to ascribe effects to one cause, which should be ascribed to many. Hence diseases have been attributed exclusively to morbid affections of the fluids by some, and of the muscles and nerves by others. Unfortunately, the morbid states of the arterial system, and the influence of those states upon the brain, the nerves, the muscles, the lymphatics, the glands, the viscera, the alimentary canal, and the skin, as well as the reciprocal influence of the morbid states of each of those parts of the body upon the arteries, and upon each other, have been too much neglected in most of our systems of physic. I consider the pathology of the arterial system as a mine. It was first discovered by Dr. Cullen. The man who attempts to explore it will probably impoverish himself by his researches ; but the men who come after him will certainly obtain from it a treasure, which cannot fail of adding greatly to the riches of medicine.

AN ACCOUNT
OF THE
STATE OF THE BODY AND MIND
IN OLD AGE;
WITH
OBSERVATIONS ON ITS DISEASES,
AND THEIR REMEDIES.

VOL. I.

3 E

AN ACCOUNT, &c.

MOST of the facts which I shall deliver upon this subject are the result of observations, made during the term of five years, upon persons of both sexes, who had passed the 80th year of their lives. I intended to have given a detail of the names, manner of life, occupations, and other circumstances of each of them; but, upon a review of my notes, I found so great a sameness in the history of most of them, that I despaired, by detailing them, of answering the intention which I have purposed in the following essay. I shall, therefore, only deliver the facts and principles, which are the result of the inquiries and observations I have made upon this subject.

I. I shall mention the circumstances which favour the attainment of longevity.

II. I shall mention the phenomena of body and mind which attend it ; and,

III. I shall enumerate its peculiar diseases, and the remedies which are most proper to remove, or moderate them.

I. The circumstances which favour longevity are,

1. *Descent from long-lived ancestors.* I have not found a single instance of a person who has lived to be 80 years old, in whom this was not the case. In some instances I found the descent was only from one, but, in general, it was from both parents. The knowledge of this fact may serve, not only to assist in calculating what are called the chances of lives, but it may be made useful to a physician. He may learn from it to cherish hopes of his patients in chronic, and in some acute diseases, in proportion to the capacity of life they have derived from their ancestors*.

* Dr. Franklin, who died in his 84th year, was descended from long-lived parents. His father died at 89, and his mother at 87. His father had 17 children by two wives. The doctor informed me, that he once sat down as one of 11 adult sons and daughters at his father's table. In an excursion he once made to that part of England from whence his

2. *Temperance in eating and drinking.* To this remark I found several exceptions. I met with one man of 84 years of age, who had been intemperate in eating; and four or five persons, who had been intemperate in drinking ardent spirits. They had all been day-labourers, or had deferred drinking until they began to feel the languor of old age. I did not meet with a single person, who had not, for the last forty or fifty years of their lives, used tea, coffee, and bread and butter, twice a day as part of their diet. I am disposed to believe that those articles of diet do not materially affect the duration of human life, although they evidently impair the strength of the system. The duration of life does not appear to depend so much upon the strength of the body, or upon the quantity of its excitability, as upon an exact accommodation of stimuli to each of them. A watch spring will last as long as an anchor, provided the forces which are capable of destroying both are always in an exact ratio to their strength. The use of tea and coffee in diet seems to be happily suited to the change which has taken place in the human body by sedentary occupations, by which means less

family migrated to America, he discovered, in a grave-yard, the tomb-stones of several persons of his name, who had lived to be very old. These persons he supposed to have been his ancestors.

nourishment and stimulus are required than formerly, to support animal life.

3. *The moderate exercise of the understanding.* It has long been an established truth, that literary men (other circumstances being equal) are longer lived than other people. But it is not necessary that the understanding should be employed upon philosophical subjects, to produce this influence upon human life. Business, politics, and religion, which are the objects of attention of men of all classes, impart a vigour to the understanding, which, by being conveyed to every part of the body, tends to produce health and long life.

4. *Equanimity of temper.* The violent and irregular action of the passions tends to wear away the springs of life.

Persons who live upon annuities in Europe have been observed to be longer lived, in equal circumstances, than other people. This is probably occasioned by their being exempted, by the certainty of their subsistence, from those fears of want, which so frequently distract the minds, and thereby weaken the bodies, of old people. Life-rents have been supposed to have the same influence in prolonging life. Perhaps the *desire of life*, in order to

enjoy for as long a time as possible that property, which cannot be enjoyed a second time by a child or relation, may be another cause of the longevity of persons who live upon certain incomes. It is a fact, that the desire of life is a very powerful stimulus in prolonging it, especially when that desire is supported by hope. This is obvious to physicians every day. Despair of recovery is the beginning of death in all diseases.

But obvious and reasonable as the effects of equanimity of temper are upon human life, there are some exceptions in favour of passionate men and women having attained to a great age. The morbid stimulus of anger, in these cases, was probably obviated by less degrees, or less active exercises, of the understanding, or by the defect or weakness of some of the other stimuli which keep up the motions of life.

5. *Matrimony.* In the course of my inquiries, I met with only one person beyond eighty years of age who had never been married. I met with several women who had borne from ten to twenty children, and suckled them all. I met with one woman, a native of Herefordshire, in England, who was in the 100th year of her age, who had borne a child at 60, menstruated till 80, and frequently

suckled two of her children (though born in succession to each other) at the same time. She had passed the greatest part of her life over a washing-tub. Of forty persons who died in different parts of the world, above 80 years of age, in the year 1806, there was but one of them that had not been married. A majority of them were women.

6. *Emigration.* I have observed many instances of Europeans who have arrived in America in the decline of life, who have acquired fresh vigour from the impression of our climate, and of new objects, upon their bodies and minds; and whose lives, in consequence thereof, appeared to have been prolonged for many years. This influence of climate upon longevity is not confined to the United States. Of 100 European Spaniards, who emigrate to South-America in early life, 18 live to be above 50; whereas but 8 or 9 native Spaniards, and but 7 Indians, of the same number, exceed the 50th year of human life.

7. I have not found *sedentary employments* to prevent long life, where they are not accompanied by intemperance in eating or drinking. This observation is not confined to literary men, nor to women only, in whom longevity, without much exercise of body, has been frequently observed. I

met with one instance of a weaver ; a second of a silver-smith ; and a third of a shoe-maker ; among the number of old people, whose histories have suggested these observations.

8. I have not found that *acute*, nor that all *chronic* diseases shorten human life. Dr. Franklin had two successive vomicas in his lungs before he was 40 years old. I met with one man beyond 80, who had survived a most violent attack of the yellow fever ; a second, who had had several of his bones fractured by falls, and in frays : and many, who had been frequently affected by intermittents. I met with one man of 86, who had all his life been subject to syncope ; another, who had for 50 years been occasionally affected by a cough ;* and two instances of men, who had been afflicted for forty years with obstinate head-aches.† I met with only one person beyond 80, who had ever been affected by a disease in the *stomach* ; and in him it arose from an occasional rupture. Mr. John Strange-

* This man's only remedy for his cough was the fine powder of dry Indian turnip and honey.

† Dr. Thiery says, that he did not find the itch, or slight degrees of the leprosy, to prevent longevity. *Observations de Physique, et de Medecine faites en differens lieux de L'Espagne. Vol. ii. p. 171.*

ways Hutton, of this city, who died in 1793, in the 109th year of his age, informed me, that he had never puked in his life. This circumstance is the more remarkable, as he passed several years at sea when a young man.* These facts may serve to extend our ideas of the importance of a healthy state of the stomach in the animal economy ; and thereby to add to our knowledge in the prognosis of diseases, and in the chances of human life.

* The venerable old man, whose history first suggested this remark, was born in New York in the year 1684. His grandfather lived to be 101, but was unable to walk for thirty years before he died, from an excessive quantity of fat. His mother died at 91. His constant drinks were water, beer, and cyder. He had a fixed dislike to spirits of all kinds. His appetite was good ; and he ate plentifully during the last years of his life. He seldom drank any thing between his meals. He was never intoxicated but twice in his life, and that was when a boy, and at sea, where he remembers perfectly well to have celebrated, by a *feu de joye*, the birth-day of queen Anne. He was formerly afflicted with the headache and giddiness, but never had a fever, except from the small-pox, in the course of his life. His pulse was slow, but regular. He had been twice married. By his first wife he had eight, and by his second seventeen children. One of them lived to be 83 years of age. He was about five feet nine inches in height, of a slender make, and carried an erect head, to the last year of his life.

9. I have not found the *loss of teeth* to affect the duration of human life, so much as might be expected. Edward Drinker, who lived to be 103 years old, lost his teeth thirty years before he died, from drawing the hot smoke of tobacco into his mouth through a short pipe.

Dr. Sayre, of New-Jersey, to whom I am indebted for several very valuable histories of old persons, mentions one man, aged 81, whose teeth began to decay at 16, and another of 90, who lost his teeth thirty years before he saw him. The gums, by becoming hard, perform, in part, the office of teeth. But may not the gastric juice of the stomach, like the tears and urine, become acrid by age, and thereby supply, by a more dissolving power, the defect of mastication from the loss of teeth? Analogies might easily be adduced from several operations of nature, which go forward in the animal economy, which render this supposition highly probable.

10. I have not observed *baldness*, or *gray hairs*, occurring in early or middle life, to prevent old age. In one of the histories furnished me by Dr. Sayre, I find an account of a man of 81, whose hair began to assume a silver colour when he was but one and twenty years of age.

11. More women live to be old than men, but more men live to be *very* old than women.

I shall conclude this head by the following remark :

Notwithstanding there appears in the human body a certain capacity of long life, which seems to dispose it to preserve its existence in every situation ; yet this capacity does not always protect it from premature destruction ; for among the old people whom I examined, I scarcely met with one who had not lost brothers or sisters in early and middle life, and who were born under circumstances equally favourable to longevity with themselves.

II. I now come to mention some of the phenomena of the body and mind which occur in old age.

1. There is a great sensibility to *cold* in all old people. I met with an old woman of 84, who slept constantly under three blankets and a coverlet during the hottest summer months. The servant of prince de Beaufremont, who came from Mount Jura to Paris, at the age of 121, to pay his respects to the first national assembly of France, shivered with cold in the middle of the dog-days, when he.

was not near a good a fire. The national assembly directed him to sit with his hat on, in order to defend his head from the cold.

2. Impressions made upon the *ears* of old people excite sensation and reflection much quicker than when they are made upon their eyes. Mr. Hutton informed me, that he had frequently met his sons in the street without knowing them, until they had spoken to him. Dr. Franklin informed me, that he recognized his friends, after a long absence from them, first by their voices. This fact does not contradict the common opinion upon the subject of memory, for the recollection, in these instances, is the effect of what is called reminiscence, which differs from memory, in being excited only by the renewal of the impression which at first produced the idea which is revived.

3. The *appetite* for food is generally increased in old age. The famous Parr, who died at 152, ate heartily in the last week of his life. The kindness of nature, in providing this last portion of earthly enjoyments for old people, deserves to be noticed. It is remarkable, that they have, like children, a frequent recurrence of appetite, and sustain with great uneasiness the intervals of regular meals. The observation, therefore, made by Hippocrates,

that middle-aged people are more affected by abstinence than those who are old, is not true. This might easily be proved by many appeals to the records of medicine; but old people differ from children, in preferring *solid* to liquid aliment. From inattention to this fact, Dr. Mead has done great mischief by advising old people, as their teeth decayed or perished, to lessen the quantity of their solid, and to increase the quantity of their liquid food. This advice is contrary to nature and experience, and I have heard of two old persons who destroyed themselves by following it. The circulation of the blood is supported in old people chiefly by the stimulus of aliment. The action of liquids of all kinds upon the system is weak and of short continuance, compared with the durable stimulus of solid food. There is a gradation in the action of this food upon the body. Animal matters are preferred to vegetable, the fat of meat to the lean, and salted meat to fresh, by most old people. I have met with but few old people who retained an appetite for milk. It is remarkable, that a less quantity of *strong drink* produces intoxication in old people than in persons in the middle of life. This depends upon the recurrence of the same state of the system, with respect to excitability, which takes place in childhood. Many old people, from an ignorance of

this fact, have made shipwreck of characters, which have commanded respect in every previous stage of their lives. From the same recurrence of the excitability of childhood in their systems, they commonly drink their tea and coffee much weaker than in early or middle life.

4. The *pulse* is generally full, and frequently affected by pauses in its pulsations, when felt in the wrists of old people. A regular pulse in such persons indicates a disease, as it shows the system to be under the impression of a preternatural stimulus of some kind. This observation was suggested to me above thirty years ago by Morgagni, and I have often profited by it in attending old people. The pulse in such patients is an uncertain mark of the nature, or degree, of an acute disease. It seldom partakes of the quickness or convulsive action of the arterial system, which attends fever in young or middle-aged people. I once attended a man of 77 in a fever of the bilious kind, which confined him for eight days to his bed, in whom I could not perceive the least quickness or morbid action in his pulse until four and twenty hours before he died.

5. The marks of old age appear earlier, and are more numerous, in persons who have combined with hard labour a vegetable or scanty diet, than

in persons who have lived under opposite circumstances. I think I have observed these marks of old age to occur sooner, and to be more numerous, in the German, than in the English or Irish citizens of Pennsylvania. They are likewise more common among the inhabitants of country places, than of cities, and still more so among the Indians of North America, than among the inhabitants of civilized countries.

6. Old men tread upon the *whole base* of their feet at once in *walking*. This is perhaps one reason why they wear out fewer shoes, under the same circumstances of constant use, than young people, who, by treading on the posterior, and rising on the anterior part of their feet, expose their shoes to more unequal pressure and friction. The advantage derived to old people from this mode of walking is very obvious. It lessens that disposition to totter, which is always connected with weakness: hence we find the same mode of walking is adopted by habitual drunkards, and is sometimes from habit practised by them, when they are not under the influence of strong drink.

7. The breath and perspiration of old people have a peculiar acrimony, and their urine, in some instances, emits a fœtor of an offensive nature.

8. The eyes of very old people sometimes change from a dark and blue to a light colour.

9. The *memory* is the first faculty of the mind which fails in the decline of life. While recent events pass through the mind without leaving an impression upon it, it is remarkable that the long forgotten events of childhood and youth are recalled and distinctly remembered.

I met with a singular instance of a German woman, who had learned to speak the language of our country after she was forty years of age, who had forgotten every word of it after she had passed her 80th year, but spoke the German language as fluently as ever she had done. The memory decays soonest in hard drinkers. I have observed some studious men to suffer a decay of their memories, but never of their understandings. Among these was the late Anthony Benezet, of this city. But even this infirmity did not abate the cheerfulness, nor lessen the happiness of this pious philosopher, for he once told me, when I was a young man, that he had a consolation in the decay of his memory, which gave him a great advantage over me. "You can read a good book (said he) with pleasure but *once*, but when I read a good book, I so soon forget the contents of it, that I have the

pleasure of reading it over and over; and every time I read it, it is alike new and delightful to me." The celebrated Dr. Swift was one of those few studious men, who have exhibited marks of a decay of understanding in old age; but it is judiciously ascribed by Dr. Johnson to two causes, which rescue books, and the exercise of the thinking faculties, from having had any share in inducing that disease upon his mind. These causes were, a rash vow which he made when a young man, never to use spectacles, and a sordid seclusion of himself from company, by which means he was cut off from the use of books, and the benefits of conversation, the absence of which left his mind without its usual stimulus: hence it collapsed into a state of fatuity. It is probably owing to the constant exercise of the understanding, that literary men possess that faculty of the mind in a vigorous state in extreme old age. The same cause accounts for old people preserving their intellects longer in cities than in country places. They enjoy society upon such easy terms in the former situation, that their minds are kept more constantly in an excited state, by the acquisition of new, or the renovation of old ideas, by means of conversation.

10. I did not meet with a single instance, in which the moral or religious faculties were impair-

ed in old people. I do not believe that these faculties of the mind are preserved by any supernatural power, but wholly by the constant and increasing exercise of them in the evening of life. In the course of my inquiries, I heard of a man of 101 years of age, who declared that he had forgotten every thing he had ever known, except his God. I found the moral faculty, or a disposition to do kind offices, to be exquisitely sensible in several old people, in whom there was scarcely a trace left of memory or understanding.

11. Dreaming is universal among old people. It appears to be brought on by their imperfect sleep, of which I shall say more hereafter.

12. I mentioned formerly the sign of a *second childhood*, in the *increase* of the appetite in old people. It appears further, 1. In a recurrence of the appetite for those articles of food which were most grateful in childhood, particularly sweet substances. The late Dr. Redman, who died in March, 1808, in the 86th year of his age, became so fond of sweet cake, for several years before his death, that he seldom passed a day without eating more or less of it. 2. In the marks which slight contusions or impressions leave upon their skins. 3. In their being soon fatigued by walking or ex-

ercise, and in being as soon refreshed by rest. 4. In their loss of the command over their limbs, so as to be unable to protect themselves from the consequences of a fall by protruding their arms. 5. In the loss of their command over the spincters of the rectum and bladder, in consequence of which they discharge their fæces in an involuntary manner, and with the same frequency which we observe in infancy and childhood. I took notice in the lectures upon animal life, of this return of involuntary motions in parts that had become voluntary from the influence of habit. 6. In their inability to rest, except in a recumbent posture. 7. In the absence of teeth. 8. In a disposition to nearly constant sleep. Dr. Haller mentions an instance of a very old man, who slept twenty out of every twenty-four hours of the last years of his life. 9. In their disposition, like children, to detail immediately every thing they see and hear. 10. In their aptitude to shed tears ; hence they are unable to tell a story, that is in any degree distressing, without weeping. Dr. Moore takes notice of this peculiarity in Voltaire, after he had passed his 80th year. He wept constantly at the recital of his own tragedies. This feature in old age did not escape Homer. Old Menelaus wept ten years after he returned from the destruction of Troy, when he spoke of the death of the heroes who perished before that city.

The famous duke of Malborough discovered the same disposition to weep in the close of his life.

11. In the absence of memory, and finally, in the extinction of every other faculty of the mind. The reader will perceive here, that not only the marks of a second childhood, but of a second infancy, are exhibited in old age, when it is protracted to its extreme point.

13. The disposition in the system to *renew* certain parts in extreme old age has been mentioned by several authors. Many instances are to be met with in the records of medicine of the sight* and

* There is a remarkable instance of the sight having been restored, after it had been totally destroyed, in an old man near Reading, in Pennsylvania. My brother, Judge Rush, furnished me with the following account of him, in a letter from Reading, dated June 23, 1792.

“ An old man, of 84 years of age, of the name of Adam Riffle, near this town, gradually lost his sight in the 68th year of his age, and continued entirely blind for the space of twelve years. About four years ago his sight returned, without making use of any means for the purpose, and without any visible change in the appearance of the eyes, and he now sees as well as ever he did. I have seen the man, and have no doubt of the fact. He is at this time so hearty, as to be able to walk from his house to Reading (about three miles) which he frequently does in order to attend church. I should

hearing having been restored, and even of the teeth having been renewed in old people a few years before death. These phenomena have led me to suspect that the antediluvian age was attained by the frequent renovation of different parts of the body, and that when they occur, they are an effort of the causes which support animal life to produce antediluvian longevity, by acting upon the revived excitability of the system.

14. The *fear* of death appears to be much less in old age, than in early or middle life. I met with many old people who spoke of their dissolution with composure, and with some who expressed earnest desires to lie down in the grave. This indifference to life, and desire for death (whether they arise from a satiety in worldly pursuits and pleasures, or from a desire of being relieved from pain) appear to be a wise law in the animal economy, and worthy of being classed with those laws which accommodate the body and mind of man to all the natural evils, to which, in the common order of things, they are necessarily exposed.

observe, that, during both the gradual loss and recovery of his sight, he was no ways affected by sickness, but, on the contrary, enjoyed his usual health. I have this account from his daughter and son-in-law, who live within a few doors of me."

III. I come now briefly to enumerate the diseases of old age, and the remedies which are most proper to remove, or to mitigate them.

The diseases are chronic and acute. The CHRONIC are,

1. *Weakness of the knees and ancles*, a lessened ability to walk, and tremors in the head and limbs.

2. *Pains in the bones*, known among nosological writers by the name of rheumatalgia.

3. *Involuntary flow of tears*, and of mucus from the nose.

4. *Difficulty of breathing*, and a short cough, with copious expectoration. A weak or hoarse voice generally attends this cough.

5. *Costiveness*.

6. *An inability to retain the urine* as long as in early or middle life. Few persons beyond 60 pass a whole night, without being obliged to discharge their urine.* Perhaps the stimulus of this liquor

* I met with an old man, who informed me, that if from any accident he retained his urine after he felt an inclination

in the bladder may be one cause of the universality of dreaming among old people. It is certainly a frequent cause of dreaming in persons in early and middle life : this I infer, from its occurring chiefly in the morning, when the bladder is most distended with urine. There is likewise an inability in old people to discharge their urine as quickly as in early life. I think I have observed this to be among the first symptoms of the declension of the strength of the body by age.

7. *Wakefulness.* This is probably produced in part by the action of the urine upon the bladder ; but such is the excitability of the system in the first stages of old age, that there is no pain so light, no anxiety so trifling, and no sound so small, as not to produce wakefulness in old people. It is owing to their imperfect sleep, that they are sometimes as unconscious of the moment of their passing from a sleeping to a waking state, as young and middle-aged people are of the moment in which they pass from the waking to a sleeping state. Hence we so often hear them complain of passing sleepless nights. This is no doubt frequently the case, but I am satisfied, from the result of an inquiry made upon this subject, that they often sleep without knowing it,

to discharge it, he was affected by a numbness, accompanied by an uneasy sensation in the palms of his hands.

and that their complaints in the morning, of the want of sleep, arise from ignorance, without the least intention to deceive.

8. *Giddiness.*

9. *Deafness.*

10. *Imperfect vision.*

The acute diseases most common among old people are,

1. *Inflammation of the eyes.*

2. The *pneumonia notha*, or bastard peripneumony.

3. The *colic*.

4. *Palsy* and *apoplexy*.

5. The *piles*.

6. A *difficulty* in making water.

7. *Quartan fever*.

All the diseases of old people, both chronic and acute, originate in predisposing debility. The remedies for the former, where a feeble morbid action takes place in the system, are stimulants. The first of these is,

I. HEAT. The ancient Romans prolonged life by retiring to Naples, as soon as they felt the infirmities of age coming upon them. The aged Portuguese imitate them, by approaching the warm sun of Brazil, in South America. But heat may be applied to the torpid bodies of old people artificially. 1. By means of the *warm bath*. Dr. Franklin owed much of the cheerfulness and general vigour of body and mind, which characterised his old age, to his regular use of this remedy. It disposed him to sleep, and even produced a respite from the pain of the stone, with which he was afflicted during the last years of his life.

2. Heat may be applied to the bodies of old people by means of *stove rooms*. The late Dr. Dewit, of Germantown, who lived to be near 100 years of age, seldom breathed an air below 72° , after he became an old man. He lived constantly in a stove-room.

3. **WARM CLOTHING**, more especially warm bed clothes, are proper to preserve or increase the heat of old people. From the neglect of the latter, they are often found dead in their beds in the morning, after a cold night, in all cold countries. The late Dr. Chovet, of this city, who lived to be 85, slept in a baize night gown, under eight blankets and a coverlet, in a stove-room, many years before he died. The head should be defended in old people, by means of woollen or fur caps, in the night, and by wigs and hats during the day, in cold weather. These artificial coverings will be the more necessary, where the head has been deprived of its natural covering. Great pains should be taken likewise to keep the feet dry and warm, by means of thick shoes.* To these modes of applying and confining heat to the bodies of old people, a young bed-fellow has been added; but I conceive the three artificial modes which have been recommended will be sufficient, without the use of one, which cannot be successfully employed without a breach of delicacy or humanity.

* I met with one man above 80, who defended his feet from moisture by covering his shoes in wet weather with melted wax; and another, who, for the same purpose, covered his shoes every morning with a mixture composed of the following ingredients melted together: lintseed oil a

II. To keep up the action of the system, **GENEROUS DIET** and **DRINKS** should be given to old people. Their food should partake largely of the fire, and it should be so cooked as to retain all its juices. By this means it is more easily divided by their gums, and more easily digested. Broiled fish, and what are commonly called stews of butchers meat, form excellent articles of diet for old people. For a reason mentioned formerly, they should be indulged in eating between the ordinary meals of families. Wine should be given to them in moderation. It has been emphatically called the milk of old age.

III. **YOUNG COMPANY** should be preferred by old people to the company of persons of their own age. I think I have observed old people to enjoy better health and spirits, when they have passed

pound, mutton suet eight ounces, bees-wax six ounces, and rosin four ounces. This mixture should be moderately warmed, and then applied not only to the upper leather, but to the soles of the shoes. This composition, the old gentleman informed me, was extracted from a book, entitled "The Complete Fisherman," published in England, in the reign of queen Elizabeth. He had used it for twenty years in cold and wet weather, with great benefit, and several of his friends, who had tried it, spoke of its efficacy in keeping the feet dry in high terms.

the evening of their lives in the families of their children, where they have been surrounded by grand-children, than when they lived by themselves. Even the solicitude they feel for the welfare of their descendants contributes to invigorate the circulation of the blood, and thereby to add fuel to the lamp of life.

IV. GENTLE EXERCISE. This is of great consequence in promoting the health of old people. It should be moderate, regular, and always in fair weather.

V. CLEANLINESS. This should by no means be neglected. The dress of old people should not only be clean, but more elegant than in youth, or middle life. It serves to divert the eye of spectators from observing the decay and deformity of the body, to view and admire that which is always agreeable to it.

VI. To abate the pains of the chronic rheumatism, and the uneasiness of the old man's cough (as it is called;) also to remove wakefulness, and to restrain, during the night, a troublesome inclination to make water, OPIUM may be given with great advantage. Chardin informs us, that this medicine is frequently used in the eastern countries,

to abate the pains and weaknesses of old age, by those people who are debarred the use of wine by the religion of Mahomet.

I have nothing to say upon the acute diseases of old people, but what is to be found in most of our books of medicine, except to recommend BLEEDING in those of them which are attended with plethora, and an inflammatory action in the pulse. The degrees of appetite which belong to old age, the quality of the food taken, and the sedentary life which is generally connected with it, all concur to produce that state of the system, which requires the above evacuation. I am sure that I have seen many of the chronic complaints of old people mitigated by it, and I have more than once seen it used with obvious advantage in their inflammatory diseases. These affections I have observed to be more fatal among old people than is generally supposed. An inflammation of the lungs, which terminated in an abscess, deprived the world of Dr. Franklin. Dr. Chovet died of an inflammation in his liver. The blood drawn from him a few days before his death was sisy, and such was the heat of his body, produced by his fever, that he could not bear more covering (notwithstanding his former habits of warm clothing) than a sheet, in the month of January.

Death from old age is the effect of a gradual palsy. It shows itself first in the eyes and ears, in the decay of sight and hearing ; it appears next in the urinary bladder, in the limbs and trunk of the body ; then in the sphincters of the bladder and rectum ; and finally in the nerves and brain, destroying, in the last, the exercise of all the faculties of the mind.

Few persons appear to die of old age. Some one of the diseases which have been mentioned generally cuts the last thread of life.

OBSERVATIONS
ON THE
DUTIES OF A PHYSICIAN,
AND THE
METHODS OF IMPROVING MEDICINE.

ACCOMMODATED TO THE PRESENT STATE OF SOCIETY AND MANNERS
IN THE UNITED STATES.

Delivered in the University of Pennsylvania, February 7, 1789, at the conclusion of a
course of lectures upon chemistry and the practice of physic.

PUBLISHED AT THE REQUEST OF THE CLASS.

VOL. I.

3 I

OBSERVATIONS, &c.

GENTLEMEN,

I SHALL conclude our course of lectures, by delivering to you a few directions for the regulation of your future conduct and studies, in the line of your profession.

I shall, *first*, suggest the most probable means of establishing yourselves in business, and of becoming acceptable to your patients, and respectable in life.

Secondly, I shall mention a few thoughts which have occurred to me on the mode to be pursued, in the further prosecution of your studies, and for the improvement of medicine.

I. Permit me, in the first place, to recommend to such of you as intend to settle in the country, to establish yourselves as early as possible upon *farms*. My reasons for this advice are as follow :

1. It will reconcile the country people to the liberality and dignity of your profession, by showing them that you assume no superiority over them from your education, and that you intend to share with them in those toils, which were imposed upon man in consequence of the loss of his innocence. This will prevent envy, and render you acceptable to your patients as men, as well as physicians.

2. By living on a farm you may serve your country, by promoting improvements in agriculture. Chemistry (which is now an important branch of medical education) and agriculture are closely allied to each other. Hence some of the most useful books upon agriculture have been written by physicians. Witness the essays of Dr. Home of Edinburgh, and of Dr. Hunter of Yorkshire, in England.

3. The business of a farm will furnish you with employment in the healthy seasons of the year, and thereby deliver you from the *tædium vitæ*, or, what is worse, from retreating to low or improper com-

pany. Perhaps one cause of the prevalence of dram or grog drinking, with which country practitioners are sometimes charged, is owing to their having no regular or profitable business to employ them, in the intervals of their attendance upon their patients.

4. The resources of a farm will create such an independence, as will enable you to practice with more dignity, and at the same time screen you from the trouble of performing unnecessary services to your patients. It will change the nature of the obligation between you and them. While *money* is the only means of your subsistence, your patients will feel that they are the channels of your daily bread; but while your farm furnishes you with the necessaries of life, your patients will feel, more sensibly, that the obligation is on their side, for health and life.

5. The exigencies and wants of a farm, in *stock* and *labour* of all kinds, will enable you to obtain from your patients a compensation for your services in those articles. They all possess them, and men part with that of which money is only the sign much more readily than they do with money itself.

6. The resources of a farm will prevent your cherishing, for a moment, an impious wish for the prevalence of sickness in your neighbourhood. A healthy season will enable you to add to the produce of your farm, while the rewards of an unhealthy season will enable you to repair the inconvenience of your necessary absence from it. By these means your pursuits will be marked by that *variety* and *integrity*, in which true happiness is said to consist.

7. Let your farms be small, and let your *principal* attention be directed to grass and horticulture. These afford most amusement, require only moderate labour, and will interfere least with your duties to your profession.

II. Avoid singularities of every kind in your manners, dress, and general conduct. Sir Isaac Newton, it is said, could not be distinguished in company, by any peculiarity, from a common well-bred gentleman. Singularity, in any thing, is a substitute for such great or useful qualities as command respect; and hence we find it chiefly in little minds. The profane and indelicate combination of extravagant ideas, improperly called wit, and the formal and pompous manner, whether accompanied by a wig, a cane, or a ring, should be all

avoided, as incompatible with the simplicity of science, and the real dignity of physic. There is more than one way of playing the quack. It is not necessary, for this purpose, that a man should advertise his skill, or his cures, or that he should mount a phaeton, and display his dexterity in operating to an ignorant and gaping multitude. A physician acts the same part in a different way, who assumes the character of a madman or a brute in his manners, or who conceals his fallibility by an affected gravity and taciturnity in his intercourse with his patients. Both characters, like the quack, impose upon the public. It is true, they deceive different ranks of people ; but we must remember that there are two kinds of vulgar, viz. the rich and the poor ; and that the rich vulgar are often upon a footing with the poor, in ignorance and credulity.

III. It has been objected to our profession, that many eminent physicians have been unfriendly to christianity. If this be true, I cannot help ascribing it in part to that neglect of public worship, with which the duties of our profession are often incompatible ; for it has been justly observed, that the neglect of this religious and social duty generally produces a relaxation, either in principles or morals. Let this fact lead you, in setting out in

business, to acquire such habits of punctuality in visiting your patients, as shall not interfere with acts of public homage to the Supreme Being. Dr. Gregory has observed, that a cold heart is the most frequent cause of deism. Where this occurs in a physician, it affords a presumption that he is deficient in humanity. But I cannot admit that infidelity is peculiar to our profession. On the contrary, I believe christianity places among its friends more men of extensive abilities and learning in medicine, than in any other secular employment. Stahl, Hoffman, Boerhaave, Sydenham, Haller, and Fothergill, were all christians. These enlightened physicians were considered as the ornaments of the ages in which they lived, and posterity has justly ranked them among the greatest benefactors of mankind.

IV. Permit me to recommend to you a regard to all the interests of your country. The education of a physician gives him a peculiar insight in the principles of many useful arts, and the practice of physic favours his opportunities of doing good, by diffusing knowledge of all kinds. It was in Rome, when medicine was practised only by slaves, that physicians were condemned by their profession "*mutam exercere artem.*" But in modern times, and in free governments, they should

disdain an ignoble silence upon public subjects. The American revolution has rescued physic from its former slavish rank in society. For the honour of our profession it should be recorded, that some of the most intelligent and useful characters, both in the cabinet and the field, during the late war, have been physicians. The illustrious Dr. Fothergill opposed faction and tyranny, and took the lead in all public improvements in his native country, without suffering thereby the least diminution of that reputation, or business, in which, for forty years, he flourished almost without a rival in the city of London.

V. Let me advise you, in your visits to the sick, *never* to appear in a hurry, nor to talk of indifferent matters, before you have made the necessary inquiries into the symptoms of your patient's disease.

VI. Avoid making light of any case. "*Respice finem*" should be the motto of every indisposition. There is scarcely a disease so trifling, that has not, directly or indirectly, proved an outlet to human life. This consideration should make you anxious and punctual in your attendance upon every acute disease, and keep you from risking your reputation by an improper or hasty prognosis.

VII. Do not condemn, or oppose, unnecessarily, the simple prescriptions of your patients. Yield to them in matters of little consequence, but maintain an inflexible authority over them in matters that are essential to life.

VIII. Preserve, upon all occasions, a composed or cheerful countenance in the room of your patients, and inspire as much hope of a recovery as you can, consistent with truth, especially in acute diseases. The extent of the influence of the will over the human body has not yet been fully ascertained. I reject the futile pretensions of Mr. Mesmer to the cure of diseases, by what he has absurdly called animal magnetism. But I am willing to derive the same advantages from his deceptions, which the chemists have derived from the delusions of the alchemists. The facts which he has established clearly prove the influence of the imagination, and will, upon diseases. Let us avail ourselves of the handle which those faculties of the mind present to us, in the strife between life and death. I have frequently prescribed remedies of doubtful efficacy in the critical stage of acute diseases, but never till I had worked up my patients into a confidence, bordering upon certainty, of their probable good effects. The success of this measure has much oftener answered, than disap-

pointed my expectations ; and while my patients have commended the vomit, the purge, or the blister, which was prescribed, I have been disposed to attribute their recovery to the vigorous concurrence of the *will* in the action of the medicine. Does the will beget insensibility to cold, heat, hunger, and danger ? Does it suspend pain, and raise the body above feeling the pangs of Indian tortures ? Let us not then be surprised that it should enable the system to resolve a spasm, to open an obstruction, or to discharge an offending humour. I have only time to hint at this subject. Perhaps it would lead us, if we could trace it fully, to some very important discoveries in the cure of diseases.

IX. Permit me to advise you, in your intercourse with your patients, to attend to that principle in the human mind, which constitutes the association of ideas. A chamber, a chair, a curtain, or even a cup, all belong to the means of life or death, accordingly as they are associated with cheerful or distressing ideas, in the mind of a patient. But this principle is of more immediate application in those chronic diseases which affect the mind. Nothing can be accomplished here, till we produce a new association of ideas. For this purpose a change of place and company are absolutely ne-

cessary. But we must sometimes proceed much further. I have heard of a gentleman in South Carolina, who cured his fits of low spirits by changing his clothes. The remedy was a rational one. It produced at once a new train of ideas, and thus removed the paroxysm of his disease.

X. Make it a rule never to be angry at any thing a sick man says or does to you. Sickness often adds to the natural irritability of the temper. We are, therefore, to bear the reproaches of our patients with meekness and silence. It is folly to resent injuries at any time, but it is cowardice to resent an injury from a sick man, since, from his weakness and dependence upon us, he is unable to contend with us upon equal terms. You will find it difficult to attach your patients to you by the obligations of friendship or gratitude. You will sometimes have the mortification of being deserted by those patients, who owe most to your skill and humanity. This led Dr. Turner to advise physicians never to choose their friends from among their patients. But this advice can never be followed by a heart that has been taught to love true excellency, wherever it finds it. I would rather advise you to give the benevolent feelings of your hearts full scope, and to forget the unkind returns

they will often meet with, by giving to human nature——a tear.

XI. Avoid giving a patient over in an acute disease. It is impossible to tell in such cases where life ends, and where death begins. Hundreds of patients have recovered, who have been pronounced incurable, to the great disgrace of our profession. I know that the practice of predicting danger and death, upon every occasion, is sometimes made use of by physicians, in order to enhance the credit of their prescriptions, if their patients recover, and to secure a retreat from blame, if they should die. But this mode of acting is mean and illiberal. It is not necessary that we should decide with confidence, at any time, upon the issue of a disease.

XII. A physician in sickness is always a welcome visitor in a family ; hence he is often solicited to partake of the usual sign of hospitality in this country, by taking a draught of some strong liquor, every time he enters into the house of a patient. Let me charge you to lay an early restraint upon yourselves, by refusing to yield to this practice, especially in the *forenoon*. Many physicians have been innocently led by it into habits of drunkenness. You will be in the more danger

of falling into this vice, from the great fatigue and inclemency of the weather to which you will be exposed in country practice. But you have been taught that strong drink affords only a temporary relief from those evils, and that it afterwards renders the body more sensible of them.

XIII. I shall now give some directions with respect to the method of charging for your services to your patients.

When we consider the expence of a medical education, and the sacrifices a physician is obliged to make of ease, society, and even health, to his profession ; and when we add to these, the constant and painful anxiety which is connected with the important charge of the lives of our fellow-creatures, and, above all, the inestimable value of that blessing which is the object of his services, I hardly know how it is possible for a patient sufficiently and justly to reward his physician. But when we consider, on the other hand, that sickness deprives men of the means of acquiring money ; that it increases all the expences of living ; and that high charges often drive patients from regular-bred physicians to quacks ; I say, when we attend to these considerations, we should make

our charges as moderate as possible, and conform them to the following state of things.

Avoid measuring your services to your patients by scruples, drachms, and ounces. It is an illiberal mode of charging. On the contrary, let the number and *time* of your visits, the nature of your patient's disease, and his rank in his family or society, determine the figures in your accounts. It is certainly just, to charge more for curing an apoplexy, than an intermitting fever. It is equally just, to demand more for risking your life by visiting a patient in a contagious fever, than for curing a pleurisy. You have likewise a right to be paid for your anxiety. Charge the same services, therefore, higher, to the master or mistress of a family, or to an only son or daughter, who call forth all your feelings and industry, than to less important members of a family and of society. If a rich man demand more frequent visits than are necessary, and if he impose the restraints of keeping to hours, by calling in other physicians to consult with you upon every trifling occasion, it will be just to make him pay accordingly for it. As this mode of charging is strictly agreeable to reason and equity, it seldom fails of according with the reason and sense of equity of our patients. Accounts made out upon these principles are seldom complained

of by them. I shall only remark further upon this subject, that the sooner you send in your accounts after your patients recover, the better. It is the duty of a physician to inform his patient of the amount of his obligation to him at least *once* a year. But there are times when a departure from this rule may be necessary. An unexpected misfortune in business, and a variety of other accidents, may deprive a patient of the money he had allotted to pay his physician. In this case, delicacy and humanity require, that he should not know the amount of his debt to his physician, till time had bettered his circumstances.

I shall only add, under this head, that the poor of every description should be the objects of your peculiar care. Dr. Boerhaave used to say, "they were his best patients, because God was their paymaster." The first physicians that I have known have found the poor the steps, by which they have ascended to business and reputation. Diseases among the lower class of people are generally simple, and exhibit to a physician the best cases of all epidemics, which cannot fail of adding to his ability of curing the complicated diseases of the rich and intemperate. There is an inseparable connection between a man's duty and his interest. Whenever you are called, therefore, to visit a poor

patient, imagine you hear the voice of the good Samaritan sounding in your ears, "Take care of him, and I will repay thee."

I come now to the second part of this address, which was to point out the best mode to be pursued, in the further prosecution of your studies, and the improvement of medicine.

I. Give me leave to recommend to you, to open all the dead bodies you can, without doing violence to the feelings of your patients, or the prejudices of the common people. Preserve a register of the weather, and of its influence upon the vegetable productions of the year. Above all, record the epidemics of every season; their times of appearing and disappearing, and the connection of the weather with each of them. Such records, if published, will be useful to foreigners, and a treasure to posterity. Preserve, likewise, an account of chronic cases. Record the name, age, and occupation of your patient; describe his disease accurately, and the changes produced in it by your remedies; mention the doses of every medicine you administer to him. It is impossible to tell how much improvement and facility in practice you will find from following these directions. It has been remarked, that physicians seldom remember

more than the two or three last years of their practice. The records which have been mentioned will supply this deficiency of memory, especially in that advanced stage of life, when the advice of physicians is supposed to be most valuable.

II. Permit me to recommend to you further, the study of the anatomy (if I may be allowed the expression) of the human mind, commonly called metaphysics. The reciprocal influence of the body and mind upon each other can only be ascertained by an accurate knowledge of the faculties of the mind, and of their various modes of combination and action. It is the duty of physicians to assert their prerogative, and to rescue the mental science from the usurpations of schoolmen and divines. It can only be perfected by the aid and discoveries of medicine. The authors I would recommend to you upon metaphysics are, Butler, Locke, Hartley, Reid, and Beattie. These ingenious writers have cleared this sublime science of its technical rubbish, and rendered it both intelligible and useful.

III. Let me remind you, that improvement in medicine is not to be derived only from colleges and universities. Systems of physic are the productions of men of genius and learning ; but those facts which constitute real knowledge are to be

met with in every walk of life. Remember how many of our most useful remedies have been discovered by quacks. Do not be afraid, therefore, of conversing with them, and of profiting by their ignorance and temerity in the practice of physic. Medicine has its Pharisees, as well as religion. But the spirit of this sect is as unfriendly to the advancement of medicine, as it is to christian charity. By conversing with quacks, we may convey instruction to them, and thereby lessen the mischief they might otherwise do to society. But further. In the pursuit of medical knowledge, let me advise you to converse with nurses and old women. They will often suggest facts in the history and cure of diseases, which have escaped the most sagacious observers of nature. Even Negroes and Indians have sometimes stumbled upon discoveries in medicine. Be not ashamed to inquire into them. There is yet one more means of information in medicine which should not be neglected, and that is, to converse with persons who have recovered from indispositions without the aid of physicians. Examine the strength and exertions of nature in these cases, and mark the plain and home-made remedy to which they ascribe their recovery. I have found this to be a fruitful source of instruction, and have been led to conclude, that if every man in a city, or a district, could

be called upon to relate, to persons appointed to receive and publish his narrative, an exact account of the effects of those remedies which accident or whim has suggested to him, it would furnish a very useful book in medicine. To preserve the facts thus obtained, let me advise you to record them in a book to be kept for that purpose. There is one more advantage that will probably attend the inquiries that have been mentioned; you may discover diseases, or symptoms of diseases, or even laws of the animal economy, which have no place in our systems of nosology, or in our theories of physic.

IV. Study simplicity in the preparation of your medicines, My reasons for this advice are as follow :

1. Active medicines produce the most certain effects in a simple state.

2. Medicines when mixed frequently destroy the efficacy of each other. I do not include chemical medicines alone in this remark. It applies likewise to Galenical medicines. I do not say that all these medicines are impaired by mixture, but we can only determine when they are not, by actual experiments and observations.

3. When medicines of the same class, or even of different classes, are given together, the *strongest* only produces an effect. But what are we to say to a compound of two medicines, which give exactly the same impression to the system? Probably, if we are to judge from analogy, the effect of them will be such, as would have been produced by neither in a simple state.

4. By observing simplicity in your prescriptions, you will always have the command of a greater number of medicines of the *same* class, which may be used in succession to each other, in proportion as habit renders the system insensible of their action.

5. By using medicines in a simple state, you will obtain an exact knowledge of their virtues and doses, and thereby be able to decide upon the numerous and contradictory accounts which exist in our books, of the character of the *same* medicines.

Under this head, I cannot help adding two more directions.

1. Avoid sacrificing too much to the *taste* of your patients in the preparation of your medicines. The nature of a medicine may be wholly changed, by being mixed with sweet substances. The Au-

thor of Nature seems to have had a design, in rendering medicines unpalatable. Had they been more agreeable to the taste, they would probably have yielded long ago to the unbounded appetite of man, and by becoming articles of diet, or condiments, have lost their efficacy in diseases.

2. Give as few medicines as possible in tinctures made with distilled spirits. Perhaps there are few cases, in which it is safe to exhibit medicines prepared in spirits in any other form than in *drops*. Many people have been innocently seduced into a love of strong drink, from taking large or frequent doses of bitters infused in spirits. Let not our profession be reproached, in a single instance, with adding to the calamities that have been entailed upon mankind by this dreadful species of intemperance.

V. Let me recommend to your particular attention the indigenous medicines of our country. Cultivate or prepare as many of them as possible, and endeavour to enlarge the materia medica, by exploring the untrodden fields and forests of the United States. The ipecacuanha, the Seneka and Virginia snake-roots, the Carolina pink-root, the spice-wood, the sassafras, the butter-nut, the thoroughwort, the poke, and the stramonium, are

but a small part of the medical productions of America. I have no doubt but there are many hundred other plants, which now exhale invaluable medicinal virtues in the desert air. Examine, likewise, the mineral waters, which are so various in their impregnation, and so common in all parts of our country. Let not the properties of the insects of America escape your investigation. We have already discovered among some of them a fly, equal in its blistering qualities to the famous fly of Spain. Who knows but it may be reserved for America to furnish the world, from her productions, with cures for some of those diseases which now elude the power of medicine? Who knows but that, at the foot of the Allegany mountain, there blooms a flower, that is an infalliable cure for the epilepsy? Perhaps on the Monongahela, or the Potowmac, there may grow a root, that shall supply, by its tonic powers, the invigorating effects of the savage or military life in the cure of consumptions. Human misery of every kind is evidently on the decline. Happiness, like truth, is a unit. While the world, from the progress of intellectual, moral, and political truth, is becoming a more safe and agreeable abode for man, the votaries of medicine should not be idle. All the doors and windows of the temple of nature have been thrown open, by the convulsions of the late

American revolution. This is the time, therefore, to press upon her altars. We have already drawn from them discoveries in morals, philosophy, and government ; all of which have human happiness for their object. Let us preserve the unity of truth and happiness, by drawing from the same source, in the present critical moment, a knowledge of antidotes to those diseases which are supposed to be incurable.

I have now, gentlemen, only to thank you for the attention, with which you have honoured the course of lectures which has been delivered to you, and to assure you, that I shall be happy in rendering you all the services that lie in my power, in any way you are pleased to command me. Accept of my best wishes for your happiness, and may the blessings of hundreds and thousands, that were ready to perish, be your portion in life, your comfort in death, and your reward in the world to come.

THE END OF VOLUME I.